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THE KENTUCKY RIVER NAVIGATION

BY
MARY VERHOEFF
MEMBER OF THE FILSON CLUB

FILSON CLUB PUBLICATIONS No. 28

THE KENTUCKY RIVER NAVIGATION

BY

MARY VERHOEFF

Member of The Filson Club

Author of
The Kentucky Mountains

Illustrated

LOUISVILLE, KENTUCKY

JOHN P. MORTON & COMPANY
(Incorporated)

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MARY VERHOEFF

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To My Mother
M. J. V.

PREFACE

THROUGHOUT the Southern Appalachians the topography of the river basins is so closely related to the economic life of the people that the geographer and geologist, the historian and sociologist find here a meeting ground. To all of them, there is offered a vast, unexploited field for intensive investigation.

The Kentucky River is in many respects a typical stream of the region. It is of national significance in that the United States Government has expended large sums for its improvement, and must provide for the maintenance of the slack-water system now almost completed.

I am indebted to Mr. R. C. Ballard Thruston, vice-president of the Filson Club, for the use of his library and for the majority of the photographs illustrating mountain industries. The United States Forest Service has contributed the illustrations for the chapter on forest products.

Louisville, Kentucky.
June, 1917.

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THE
KENTUCKY RIVER NAVIGATION

CHAPTER I

INTRODUCTION

The Kentucky River[A] and its tributaries are confined within the limits of the State of Kentucky. The main stream, 254 miles from its mouth at Carrollton on the Ohio River to its source near Beattyville in Lee County, is formed by the confluence of three tributaries commonly known as the Three Forks. These headstreams and their branches, which occupy

[A]The name Kentucky is from the Iroquois word "kentake," meaning prairie or meadow land. (R. T. Durrett, The Centenary of Kentucky, Filson Club Publications No. 7, page 38.)

The river has been known by many names. Franquelin's map of 1684, based upon data furnished by La Salle, gives a river in what is now Kentucky called "Skipaki-cipi eu la Riviere Bleue." This is evidently the same name as that of the old Shawnee town located in Clark County near the Blue Lick Springs. (See p. 42, Note B.) The map shows two Shawnee towns on the river, and it is possible that the Kentucky—instead of the Cumberland, as commonly supposed—was the river referred to and the old Shawnee River or "Riviere des Chaouanons." Croghan, the Indian trader, as late as 1777, refers to the Blue Licks on the Kentucky River. (Charles A. Hanna, The Wilderness Trail, Vol. II, pp. 92, 256.) On Charlevoix's map of 1744 the river was called Chonanono. On Palairet's map of 1756, the upper stream bore the name Milley's River. Dr. Walker, who visited the mountains in 1750, referred to the river by that name, and also as the Cuttaway. The former is probably a contraction by hunters and traders of the Miami Indian name Millewakeme. Other Indian names were Cuttawaba, Chenoka, and Chenoa. (Johnston's First Explorations of Kentucky, Filson Club Publications No. 13, pp. 63, 153.) On the Pownall-Evans map (1755-1775) the stream is laid down as the Kentucke or Cuttawa. By the time that settlements were established in the State, the former had been quite generally adopted, although the pioneers often referred to the river as the Louisa or Levisa, a name incorrectly supposed to have been given it by Dr. Walker in honor of the sister of the Duke of Cumberland. (Collins, History of Kentucky, Vol. I, p. 17; Vol. II, p. 416. See also the McAfee Journals in the Woods-McAfee Memorial, by N. M. Woods, Louisville, 1905, p. 433, and Petition No. 2, in Petitions of the Early Inhabitants of Kentucky, etc., by J. R. Robertson, Filson

a large proportion of the drainage basin[A] of the river, flow through the Kentucky Mountains, the eastern coal field, while the main stream leaves the coal field near Irvine in Estill County, opposite the mouth of Station Camp Creek, and continues for over two hundred miles through the Bluegrass.[B]

Of the three tributaries North Fork is most important. One hundred and fifty-five miles in length, it heads in Pine Mountain at Payne Gap, near Pound Gap, against Elkhorn Creek of the Big Sandy. At Beattyville it meets South Fork, which is formed by Goose Creek and Red Bird Fork both heading in the Kentucky Ridge, a watershed of the Cumberland River just west of Pine Mountain. Middle Fork rises in Pine Mountain, interlocks its numerous branches with those of the

Club Publications No. 27, p. 36.) The river from its mouth to the "head spring" of its "most northwardly branch" was the northern boundary of the vast tract of land sold by the Cherokee Indians to Richard Henderson and his associates. It was referred to in the deed of March 17, 1775, as the "Kentucky or Chenoca or what by the English is called Louisa River." (For treaty see Mann Butler, History of Kentucky, second edition, Appendix. Cincinnati, 1836.)

[A](For a description of the topography of the Bluegrass and mountains see Verhoeff, The Kentucky Mountains, Filson Club Publications No. 26, pp. 1-24.) There are thirteen counties in the Bluegrass contiguous to the river with a total area of 3,394 square miles, and eleven in the mountains with an area of 3,118 square miles. (See Appendix, p. 211.) The total drainage basin of the stream is estimated by the United States Geological Survey to be 7,870 square miles in extent, 5,140 square miles of which are above Frankfort. (Water Supply Papers No. 243, p. 87.)

[B]At extreme headwaters, the tributaries originate in the Pine Mountain fault, and show the rectangular arrangement characteristic of the Appalachian Valley streams. Here the Pine Mountain scarp forms the sides of the valleys exposing strata from the Lee Conglomerate through the Devonian formation. (Verhoeff, The Kentucky Mountains, pp. 14-16.) North and west of Pine Mountain, the river flows transversely across the eastern flank of the Cincinnati arch to its crest in the Bluegrass region, and then descends the western flank of the arch to the Ohio. (See p. 9, Note A.) From the Pine Mountain fault to the junction of the Three Forks, the valleys expose the Coal Measures, but the column lacks many of the upper strata found in the Black Mountains, a region not drained by the Kentucky. Below Beattyville, the western scarp of the coal field forming the sides of the valleys, exposes the same formations as those of the Pine Mountain scarp. In the Bluegrass, strata from the Silurian through the Highbridge formation of the Ordovician, form the valley walls. The river valley, in its entire length, thus exposes all of the Paleozoic formations in Kentucky with the exception of the higher Coal Measures and the lowest strata of the Ordovician. (See Verhoeff, The Kentucky Mountains, p. 14.)

Cumberland, and enters North Fork about four miles above Beattyville.[1]

The Kentucky is the modern representative of an ancient stream that was greater in width and volume and probably in length. Geologically it is older than the Ohio.

After the final emergence of the Appalachian province from the sea, a long period of erosion followed resulting in the formation of the Cumberland peneplain.[A] The central part of the province was then drained northwestward toward the Ohio Valley. The New-Kanawha River and many of the eastern tributaries of the Tennessee, such as the French Broad, are thought to be parts of old drainage lines which originated beyond the Blue Ridge and crossed what is now the Cumberland Plateau, a section of the Appalachian coal field.

The Kentucky was perhaps the western extension of one of these streams when the land sloped as a more or less featureless plain from the western face of the Appalachian Mountains towards the northwest. The Appalachian Valley and the smaller valleys had not yet been eroded.[2] After the uplift of the peneplain the northwestward flowing drainage persisted for a time, and in Kentucky the streams in their upper courses cut gorge-like channels through hard beds of sandstones and conglomerates. These formations thus notched by the through-flowing streams later capped Pine and Cumberland Mountains, the ridges developing with the downward cutting of lateral drainage.[3]

[A]See Verhoeff, The Kentucky Mountains, pp. 17-18, Note A. "A peneplane is not 'almost a plain' of horizontal sediments but is almost a plane surface in the mathematical sense of the term; therefore 'peneplane' more clearly expresses the meaning of the term than does the older and commoner spelling." (D. W. Johnson, Plains, Planes, and Peneplanes, The Geographical Review, June, 1916, p. 445.) Quotation from authorities renders the usual spelling preferable in this work.

In the meantime streams emptying into the Gulf of Mexico were working backward in easily eroded limestones, cutting out the Great Valley. This drainage, the upper section of which is now tributary to the Tennessee, gradually beheaded[4] the northwestward flowing streams[A] one after the other, until the waters of all the western flank of the Appalachian Mountains, nearly or quite to New River, had been turned into its channels. The beheaded streams continued for a while to flow through the gorges of the plateau conglomerates but their energy was lessened by the loss of headwaters, and finally they were also diverted, leaving the gorges as wind-gaps in the plateau ridges.[5] The North Fork of the Kentucky is in all probability the beheaded section of a stream which temporarily held its course through Pound Gap.

Before the close of pre-glacial times a second peneplain had been formed along the lower reaches of the northwestward flowing streams, and the process of leveling had again been interrupted by elevation.[6] The drainage system of the Kentucky had assumed practically its present lines, but it gained the sea by a more circuitous route than is now afforded. At that time

[A]The Gulf streams had the advantage of a shorter course to the sea, giving them a steeper gradient and greater eroding power and they were not retarded in their cutting by resistant sandstones as were the westward flowing streams. The trunk stream held its course to the Gulf across the present Tennessee-Coosa divide for some time after the elevation of the Tertiary peneplain. "Later, land movements below Chattanooga raised a barrier across the course of this southward drainage and ponded the upper waters. This gave one of the old westward flowing streams time to cut down its channel across the plateau and to tap the drainage waters of the Great Valley and to divert them to the Mississippi or Ohio. In so doing, the diverting stream may have regained most of its old head streams as well as the drainage captured by the stream that flowed to the Gulf. The two became the Tennessee River of to-day." (Ashley and Glenn: Geology and Mineral Resources of a part of the Cumberland Gap Coal Field, Kentucky, U. S. Geological Survey, Professional Paper No. 49, 1903, p. 17.) For the history of drainage in the Southern Appalachians, see Hayes and Campbell, Geomorphology of the Southern Appalachians, National Geographical Magazine, Vol. VI, 1894. C. W. Hayes, Physiography of the Chattanooga District in Tennessee, Georgia, and Alabama, 19th Annual Report of the U. S. Geological Survey, 1897-1898.

the river was the southern tributary of an ancient stream, the Old Laughery, whose headwaters were made up of the section of the Ohio and its tributaries between the Great Miami and Madison, Indiana. This stream extended up the Great Miami, reversed, through an old deserted valley in Hamilton County, Ohio, back to the Miami, and thence to Hamilton. From there with the Licking, which then continued across the present Ohio Valley, the trunk stream flowed northward into the pre-glacial Newark River. The course of the latter stream has not been determined but it probably discharged northward into eastern Indiana where it turned southwest to join some tributary of the Mississippi embayment.[7]

The modification of the drainage was due to the indirect effects of glacial action. At the beginning of the Quarternary period, there was a great change in climatic conditions which permitted the formation of a vast ice sheet in northeastern North America. The ice, at its maximum advance, reached beyond the present Ohio River into Kentucky and there its southern boundary is now defined by a narrow band of bowlder-clay deposits along the northern border of the Bluegrass region.[A] After melting had taken place in the United States, there were other glacial invasions which extended into Ohio but which did not reach Kentucky.[8] The ice in Ohio stood as an effective barrier to the northwestward flowing

[A]The southern boundary of the bowlder-clay formation marks the farthest extent of the Illinoian ice sheet. It extends from the southern line of Oldham County to Carrollton at the mouth of the Kentucky, and thence to the mouth of the Licking at Fort Thomas and along the Ohio to Augusta where it swings eastward into Ohio. A morainic deposit, less than a mile wide, with a height of 200 feet above the Ohio, fills a sag in the hills between the Kentucky and Ohio Rivers at Carrollton. A buff loam or loess resting upon the till has been considered a deposit formed during the closing stages of the Iowan glaciation. Coarse sand and gravel deposited from the waters supplied by the melting of the Wisconsin ice sheet form terraces along the Ohio near the mouth of the Kentucky. (Matson, Water Resources of the Bluegrass Region of Kentucky, U. S. Geological Survey, Water Supply Paper 223, pp. 13, 25.)

rivers and the accumulation of silt and the great volume of water produced finally caused in the main streams of Ohio and Indiana a reversal of drainage and a deflection over cols in the divides, resulting in the formation of the middle Ohio River.[9]

The most striking topographic features of the Kentucky basin are portions of the two great peneplains which have been traced throughout the southern Appalachian province.[10] The one ascribed to the Tertiary period is represented by the broad uplands of the Bluegrass with an average elevation of 1,000 feet and is named from Lexington, its principal city. The other, probably of Cretaceous age, is represented by the surface of the rounded or sharp-topped mountains. It stands at about five hundred feet above the Lexington peneplain increasing in elevation towards the south and east until at headwaters it attains a height of over 3,000 feet above sea level.[11]

The river now flows in a gorge which it has cut far below these surfaces but there is evidence that the present course has been inherited from a larger stream that meandered widely in a broad valley when the peneplains were near their base levels. Since their elevation the downward cutting of the stream has been interrupted at various times so that the valley is complex in character.[A] Its Bluegrass portion is described by the United States Geological Survey:[12]

"The valleys which are cut below the surface of the Lexington plain are complex in character and show that they are the results of two episodes of erosion. When viewed upon the ground it is apparent that there is a long gentle slope from the surface of the Lexington peneplain leading down to the brink of steep walls which bound the inner valley of the river. The gentle slopes constitute the sides of an older valley which was broad. The narrow modern gorge has been cut within it.

"Upon the floor of the older valley occur deposits of sand and clay which were laid down by the river when it occupied this valley before the inner gorge was cut. In order that such widespread deposition should have taken place the streams must have had moderate fall and have been unable to carry farther the load of sand and mud which they carried with ease in the narrow upper valley in the Coal Measure Plateau. The sediments were laid down in a sort of delta deposit across the entire width of the old valley; they are now found only on the tops of the river hills which mark the surface of the intermediate valley."[A]

Within the Bluegrass gorge there are bottoms and other terraces which also mark interruptions to the dissection.[B] Here the stream in general has maintained the meanders of the early

[A]According to the United States Geological Survey (M. R. Campbell, Richmond Folio No. 46, Geological Atlas, U. S., 1898) the intermediate valley must have been formed soon after the Lexington peneplain was raised above sea level, since it is cut only a slight distance below the surface and to a moderate breadth. On the assumption that the peneplain is of Eocene origin (see Verhoeff, The Kentucky Mountains, p. 17, Note A) the intermediate valley and the deposits (Irvine formation) are referred to the Neocene of the Tertiary period, and the inner gorge to late Neocene and early Pleistocene. Miller, of the Kentucky Geological Survey (Geology of Franklin County, Series IV, Vol. II, Part 3), has found, however, the remains of extinct Pliocene or early Pleistocene mammals in such association with the deposits as to indicate that they are of the same age. It would seem, therefore, that the deposits are not older than Pliocene, and that the cutting of the gorge took place during the inter-glacial epoch rather than in the early Pleistocene. The distribution of the Irvine formation, in some localities at a great distance from the present valley, indicates a considerable change in the course of the river since pre-glacial times. In Franklin County the deposits are found west of the river in the Cedar Run precinct, extending over into the Benson drainage of the Bridgeport precinct. (*Ibid.*)

[B]Fragments of terraces covered with deposits from ten to eighty feet in thickness, which appear to be in part of glacial origin and in part of post glacial, rise eighty feet and less above the river. These terraces, in places a mile wide, have an altitude about the same as those on the Ohio and were probably formed at the same time. (See p. 5, Note A.)

Below the level of the glacial terraces are deposits of recent origin. They are nowhere extensive and exceed fifty feet in thickness in few places. "At various points above Frankfort the stream is bordered by rock terraces bearing narrow strips of alluvium, in most places composed of fine sand with a few layers of pebbles. Below Frankfort the alluvial deposits are more extensive, locally forming bands more than one-fourth mile wide." (Matson, G. C., Water Resources of the Bluegrass Region of Kentucky, U. S. Geological Survey, Water Supply Paper 233, pp. 13, 38, 107, 119.)

cycles but in places the route has been shortened by cuts across the neck of bends, and the deserted ox-bows in some localities form broad benches.[A]

In the mountains the tortuous course[B] of old flood plains has likewise been maintained by the river and its tributaries but dissection has been in progress so long and so continuously that, except for lower terraces which extend to headwaters, the records of physiographic history are indistinct.[C]

Throughout its length the Kentucky is thus deeply intrenched. A marked contraction occurs just above Frankfort,

[A]The best preserved remnants of isolated terraces along the main river are at Gratz, in Owen County, and in Franklin County at Frankfort, at Polsgrove, and at the mouth of Vaughn's Creek. There are numbers of them on the Elkhorn Creek and other tributaries. (Miller, Geology of Franklin County, p. 13.) In such cases the terrace surrounds hills that have been separated from the upland by the erosion of the stream, the separation having taken place probably in part since the formation of the terrace, for the channel surrounding the hills has been excavated below the level of the terrace. (Matson, Water Resources of the Bluegrass Region, p. 119.)

[B]Within the mountains the meanders are usually short, but here, as in the lowlands, there are sometimes broad curves. The North Fork, in the vicinity of Jackson, Breathitt County, makes a detour of over five miles and returns to within sixty feet of the point of departure. A tunnel through the rock partition has furnished water-power, there being a difference in elevation of eight or nine feet in the stream bed. (Report Chief of Engineers, U. S. A., 1879, p. 1414.)

[C]Much of the valley topography, at least in the Bluegrass section, is doubtless the result of indirect glacial action. If the deposits on the old valley floor are of Pleistocene age (see Note A, p. 7), this is the first evidence of such action. The modifications in the Kentucky drainage have not been worked out in detail, but the sequence of events has probably been the same as in the basins of the Big Sandy and Kanawha Rivers, the pre-glacial tributaries of the old Scioto which also discharged into the Newark system. In these basins it has been shown that the intermediate valley was formed soon after the Tertiary peneplain was raised above base level, presumably in the late Neocene period. Slack-water conditions began in the Pleistocene with the earliest advance of the ice sheet, and continued until a period of erosion was inaugurated by the elevation of the region or by the modification of the Ohio River drainage, giving to the eroding streams a shorter course to the sea. During this cycle of deposition the accumulations on the old valley floor were so great that in places the streams were deflected around them in circuitous courses. Some of the new channels were deserted for the old silt filled valleys when by erosion the streams discovered underlying resistant rock, but extensive deposits of the Irvine formation away from the present Kentucky might be accounted for by such modifications in the course. (See Note A, p. 7.)

The cycle of erosion continued during the period of ice recession and was brought to a halt by the more recent invasions when slack-water conditions were again produced resulting in the formation of glacial terraces. (See Note B, p. 7.) When the ice sheet again receded, the streams, relieved of their load once more, began to erode. As new lines of discharge were opened for glacial waters, they

and as far as Boonesborough hills rise 300 to 400 feet perpendicularly from the banks.[A] Above, the valley widens for a short distance but again narrows and deepens as it approaches the mountains. Here there is a gradual increase in the height of the hills until at headwaters they tower from 1,000 to more than 1,600 feet above the streams.[13] In the mountains the most insignificant tributaries likewise flow through deep V-shaped valleys. In the Bluegrass this is also true of the affluents near the main river but at headwaters the valleys are broad, shallow, and level-floored.[14] The deep gorge of the Kentucky renders approach by land difficult. In the Bluegrass, transportation lines have avoided the river, crossing it at a number of strategic points. In the mountains there are few alternative routes and the valley has been followed by railroad and highway alike into the interior.

were periodically reduced in volume, leaving the lower terraces in the valleys. The final withdrawal of glacial currents reduced the streams to conditions dependent upon meteroic waters. During this cycle silt was removed and deserted channels and minor deflections over rock barriers occurred. (See Note A, p. 8.) At sometime after the deep cutting of the valley, a lacustrine condition was produced, probably by an obstruction in the through-flowing stream, causing deposition of silt on the terraces. (W. G. Tight, Drainage Modifications in Southeastern Ohio and adjacent parts of West Virginia and Kentucky. U. S. Geological Survey, Professional Paper No. 13, 1903.)

[A]The river here crosses the Cincinnati anticline near its apex. This broad dome-shaped arch extending across central Kentucky has been so beveled by erosion that its structure has no apparent effect upon the surface. (See Verhoeff, The Kentucky Mountains, p. 14, Note A; p. 17, Note A.) From Clark County the river flows up the arch following a transverse fault (Kentucky anticlinal) to the crest at the mouth of Dix Diver (Highbridge) and from that point descends the western slope by other faults (Frankfort Fault Zone), which, in their southern extension, define the course of the latter stream. From a point just below Frankfort to Camp Nelson at Hickman Creek, Jessamine County, the Highbridge limestone, the oldest formation in Kentucky, forms the walls of the river gorge. This is a very resistant cliff-making rock and here the gorge is generally but little wider than the stream. Further upstream the fault, in places, exposes the Highbridge limestone on one side and on the other more easily eroded calcareous shales and sandstones (Eden-Maysville-Winchester formations), and differential erosion results. "On the one side of the fault the cliffs are so steep that it is impossible to ascend them; on the other side fields of corn extend down the gently sloping walls to the flood plain of the river. This change from one type of valley to the other is repeated several times as the river meanders back and forth across the fault line." (Matson, Water Resources of the Bluegrass Region, pp. 26, 38. Kentucky Geological Survey, Series IV, Vol. I, pp. 446, 465.)

The average width of the main stream is 280 feet. That of the forks[A] is much less.[15] The volume changes constantly. Fed by innumerable surface streams the river rises with each rainfall. High water is common during the six months from January to June. The maximum rise usually occurs in February and is due to melting snow. During the six warmer months the river is often low, and in August, September, and October the smaller tributaries are sometimes dry for long distances.[B]

The flow of the main stream is to a certain extent rendered constant by contrasting conditions of rainfall and topography existing in the lower and upper basin. In the Bluegrass more than half the annual precipitation of forty to fifty inches (mean annual) is received during the six cooler months of the year

[A]North Fork is 225 feet at mouth, 125 feet at Hazard, eighty feet at Whitesburg, and but eight feet near Payne's Gap. South Fork decreases from 200 feet at mouth to 150 fee at Goose Creek, and the latter stream from 100 feet at mouth to eighty-five feet at Collin's Fork. Middle Fork is 110 feet at mouth, but the average width for sixty-eight miles is 130 feet. (Annual Report Chief of Engineers, U. S. A., 1879, pp. 1412-1416.)

[B]In some years the rises attain unusual heights and not only injure works of improvement on the river, but result in enormous losses of property throughout the basin. The most insignificant creeks and branches at times cause widespread damage. Such floods have been common since the beginning of settlement in Kentucky. One of the most disastrous overflows occurred in 1817, when many valuable warehouses were washed away. Collins cites many instances: (Vol. I, p. 56) "December 9, 10, 1848, much of the town of Frankfort was submerged, the water from three to six feet deep in houses. Immense damage done in washing away houses, mills, dams, fences, stacks of grain and hay, hogs, and other farm stock. On Lulbegrud Creek, in Clark and Montgomery Counties, Boone Creek in Fayette, Benson Creek in Franklin, and Valley Creek in Hardin County, every mill was swept off and most of those on Elkhorn and its forks." (Vol. 1, p. 71) "March 10, 1854, Kentucky River rose one and one-half feet per hour for fifteen hours; large part of Frankfort submerged; on Elkhorn, Steadmans' paper mill dam swept off with many others, and the inhabitants along the creek compelled to flee from their houses; many bridges carried away and the fencing along all the streams; railroad tracks undermined and settled; trains suspend for six days on the Covington and Lexington Railroad." (Vol. I, p. 228) "April 9, 1872, greatest flood in the upper Kentucky River since 1817; river rose fifteen feet in six hours; over 20,000 saw logs, the property of poor people, floated off and lost; above Irvine, Estill County, most of those residing on the river bottoms were driven from their homes by the rising flood; many houses, coal and iron boats, corn boats, washed away and stock drowned. Eagle Creek, in Grant, Owen, Carroll, and Gallatin Counties was four feet higher than ever known; great damage done."

when evaporation is least, while in the mountains, where the precipitation is heavier (50-60 inches), the greater portion falls from April to September, inclusive.[16] In the mountains, moreover, except where the forest cover exists,[A] there is an immediate run-off from the steep and narrow watersheds. In the Bluegrass, also, much of the rain is carried immediately into the streams, but most of the divides have broad rolling surfaces covered with a deep soil which absorbs the downpour. Here, too, a vast system of subterranean drainage tends to conserve the water, as many streams entering sink holes and caves flow for long distances in underground channels before reappearing as springs.[B] The following description is typical of the region:[17] "The presence of caverns along the Kentucky River, and numerous sink holes and springs on the uplands, indicate that the underground drainage is very extensive. Some of the sink holes are several acres in extent, and many of the springs give rise to streams of considerable size. The large springs, as a rule, emerge at the heads of small gullies rather than along the river. The peculiar location of the springs is explained by the

[A]The fact that the Three Forks head in the Pine Mountain escarpment is favorable to the steady flow of the mountain streams. The ridge is capped with the Lee Conglomerate, one of the few Coal Measure sandstones adapted to the storage of water, while in the escarpment the fault has brought a number of the same limestones to the surface that furnish water in central Kentucky. (Verhoeff, The Kentucky Mountains, p. 15.)

[B]The utilization of the spring water in the Bluegrass also retards run-off. "The water which emerges in sufficient volume to form a stream is called a spring. Springs are formed by water coming from underground streams or by the concentration of percolating water at one point. . . . . In the Bluegrass region springs form a very important source of water for domestic and industrial uses, but they are especially important as sources of water for stock. They occur in all parts of the region and in all geological formations but large springs are numerous only in the Lexington and Highbridge limestones. A hole excavated about a spring or seep is commonly called a pool. Pools are usually walled with rock or cement and serve as reservoirs for storing ground water. Some of the pools in the Bluegrass region are ten feet or more in depth. On one side an opening is left through which the animals may enter the water and the floor of the pool is made to slope from the entrance so that the animals may reach the water as the surface recedes during dry weather." (Matson, Water Resources of the Bluegrass, etc., p. 68.)

fact that the gully represents merely the portion of the underground channel where the roof has fallen."

The great depth of the river valley, together with the sinuosity of the channel, results in a very gradual fall from headwaters to the Ohio.[18] In fact, the main stream and the Three Forks have practically come to grade, a condition favorable to navigation.[A]

To the first settlers, nevertheless, the river and its tributaries presented serious obstacles. The channels, from mouth to headwaters, were blocked with islands and shoals of rocky reefs, with overhanging trees and snags, with bars of gravel and drifting sand.[B] To these were soon added artificial obstructions—timber booms, mill and fish dams.[C] Moreover,

[A]On the main stream the descent is very gentle, averaging seven inches to the mile between the mouth and Frankfort, and less than one foot per mile from that point to Beattyville. On the Forks the fall per mile is greater, and there is an increase upstream. On North Fork, between the mouth and Troublesome Creek (fifty-two miles), there is a fall per mile of 1.6 feet. In the eighty-nine miles to Whitesburg, there is an increase from three feet to ten feet per mile, and between the latter point and headwaters (eighteen miles) an increase from eleven feet to 308 feet per mile. On Middle Fork there is an increase of from 1.1 feet to 3.2 feet per mile within sixty-eight miles of the mouth. On South Fork (forty-three miles) the descent averages 3.13 feet per mile, and on Goose Creek 2.6 feet per mile for twenty-six miles. (Report Chief of Engineers, U. S. A., 1879, pp. 1411-1416, Tables. For distances, see Appendix.)

In the mountains there are no vertical water-falls except at the headwaters of the minor streams. Such falls are numerous in the lower counties. One of the most conspicuous is on Walker's Branch of North Fork near Torrent, Wolfe County. In the Bluegrass there are no falls at the headwaters of the main tributaries but the descent to the Kentucky is usually made within a few miles in deep narrow gorges having very steep gradients. Some of them descend 300 feet or more in a distance of three or four miles. Eagle Creek and Dix River have higher gradients than the main stream at the points of junction. (Matson, Water Resources of the Bluegrass, p. 38.)

[B]The most serious obstacles in mountain streams occur in rocky gorges, known as roughs and narrows, which are especially numerous in the lower counties. (Verhoeff, The Kentucky Mountains, pp. 11-12.) Here the bends are short and frequent, and easily eroded shale between more resistant formations is worn away leaving high reefs in the channels. On North Fork "narrows" begin at Beattyville and extend to the mouth of Holly Creek, a distance of about twenty-five miles. (Kentucky House Journal, 1838-1839, Appendix, pp. 118-119.) On South Fork a gorge begins about thirty-eight miles above the mouth and extends one and a half miles with a grade of twelve and a half feet. (Kentucky House Journal, 1837-1838, Appendix, p. 140.)

[C]When settlement began in Kentucky fish abounded in the streams. Filson, in 1784, notes: "Trout have been taken in Kentucky weighing thirty weight. The

fluctuation in stream volume rendered navigation impossible during several months of every year, the depth of water[19] varying with seasonal changes from a few feet to a flood level of from twenty-three to more than forty feet.[A]

Since an early date efforts have been made to overcome these difficulties by the improvement of the streams, which was undertaken first by the State and later by the Federal Government. Two methods have been employed—open channel work, and the construction of a slack-water system.

Open channel work undertakes obstruction removal and regularization, that is concentration of water at the shoals by means of wing-dams, dikes, and training walls. As most of the obstacles are recurrent[B] this method necessitates constant labor and at best it makes possible only an intermittent navigation since it does not attempt to control stream flow. Its chief result has been to facilitate during seasons of sufficient water the navigation of rafts and other steamless craft, such as push-boats which are flatboats propelled by oars. On the main river it has also meant an increase in safety for the steamboat.

A system of slack-water converts the river into a canal, a series of locks and dams being built to conserve the water in connected pools. In this way a channel may be provided

mullet, rock perch, garfish and eel are here in plenty; suckers, sun-fish and other hook fish are abundant," etc. (Filson's Discovery, Settlement and Present State of Kentucky, Imlay's Topographical Description, etc., pp. 296-297.)

[A]Swift currents, which were an aid to descending steamless craft, rendered the return navigation extremely difficult. During high water the current averages four miles an hour and at low water, two miles. On an average of fifteen days during the winter the streams are liable to be ice-bound. When the weather is severe ice gorges sometimes block the channels for days. There are many winters so open, however, that navigation is not interrupted by ice.

[B]After each rainfall the flood water of the innumerable tributaries is loaded with debris, which, deposited in the river, builds alluvial fans, dams, and islands. Before the improvement of the river, the islands, in places were ten and twelve feet high. (Surveys.)

navigable throughout the year for steamboats,[A] except when floes of thick ice gorge the stream, or raging floods fill it with debris. For the prevention of these disasters no provision has been made where slack-water has been established, although many schemes have been suggested.

The most ambitious proposition recommends the regulation of stream flow by the construction of immense storage reservoirs at headwaters. Accompanied by a system of forest conservation within the mountains, this project looks to the diminution of flood damage and silt deposition and a corresponding reduction in the cost of maintenance for slack-water or open channel improvement. It is expected that an annual income from the sale of timber will result and that water-power[B] now

[A]Prolonged droughts occasionally reduce the flow below navigation limits, but during the ordinary summer stages the volume of the main river from the mouth to Middle Fork averages about 20,000 cubic feet per minute. The high water discharge has not been measured at any point. April 16, 1906, a discharge of 10,800 feet per second at a gauge height of 8.12 feet was measured at Frankfort. (Report Chief of Engineers, U. S. A., 1879, p. 1417. Water Supply Papers, No. 205, U. S. Geological Survey.)

The volume of the Forks is much less, as is indicated by data compiled in 1879:

Stream	Locality	Cubic ft. per min.	Remarks.
North Fork	Whitesburg	86	Lowest stage for 20 years.
	Leatherwood	300	Lowest stage for 20 years.
	Hazard	700	Lowest stage for 20 years.
	Troublesome	1,700	
	Jackson	1,700	
	Middle Fork	20,000	Ordinary summer stage.
Middle Fork	Crockettsville	1,507	Ordinary summer stage.
	Mouth	3,600	Ordinary summer stage.
South Fork	Goose Creek	216	Taken at dead low water.
	Red Bird	177	Taken at dead low water.

(Report Chief of Engineers, U. S. A., 1879, p. 1417, Table 6.)

[B]The scheme is based on government investigations of the Southern Appalachian streams. The records of stream measurements on the Kentucky are incomplete. The following conservative estimates indicate the potential horsepower to be gained by a reservoir system:

	Minimum horse-power	Assumed maximum horse-power	Value at $20 per horse-power
Kentucky River	18,100	45,100	$902,000

(Water Supply Paper No. 243, p. 54, U. S. Geological Survey.)

In 1909, when the investigation was made, there were 158 wheels in operation

fluctuating with stream volume will become constant and in itself be capable of furnishing a revenue sufficient to maintain the navigable channel.[A]

In such a plan collateral advantages[20] are deemed as important as navigation,[B] but all projects for the Kentucky which have actually been put into effect, have been adopted on the supposition that benefit to commerce alone would justify the necessary expenditures.

with a total horse-power of 2,916. (*Ibid*, p. 39.) The power was obtained at the locks or by dams at the shoals.

Formerly there was a much more extensive use of water-power. In the course of river improvements many establishments have been removed as obstacles to navigation or because the shoals have been destroyed. The decrease in the number of wheels is also due to the inability of intermittent water-power to compete with the cheap all-year-round power furnished by steam or gasoline.

[A]The Kentucky reservoirs would form part of a vast system projected to be built at the headwaters of the principal tributaries of the Ohio in the Appalachian uplands for the benefit of navigation, the prevention of floods, and the development of power on the trunk stream. The plan was presented to the Inland Waterways Commission by Mr. W. O. Leighton, of the U. S. Geological Survey, and published in the preliminary report. It is an enlargement of a project proposed by Charles Ellet in 1853, which required dams across only a few tributaries and which did not provide primarily for water-power. (Collins, History of Kentucky, Vol. I, p. 67.) In the final report of the National Waterways Commission it is shown that reservoirs built to aid navigation will not prevent overflow or provide power sufficient to pay their way unless the storage capacity equals the sum volume of water required for each project separately. This involves an enormous expenditure for construction and for damages to land which probably for many years to come will not be warranted by industrial conditions in the Ohio basin. (For full discussion see preliminary and final reports of the United States National Waterways Commission, Washington, 1910, 1912; a review of the final report by Robert Brown in the Annals of the Association of American Geographers, Vol. III, pp. 88-92; the Regulation of Rivers, by J. L. Van Ornum, New York, 1914.)

[B]There have also been schemes to develop power on the tributaries at the expense of navigation by the erection of high dams near the mouths for storage of flood water. (See p. 152, Note A.) On many streams this would mean a heavy cost for damages which would result from the flooding of valuable property above the dam. On North Fork, for example, there are numerous towns along the river banks and also a railroad, which would effectually preclude the use of high dams. Where the streams flow through rocky gorges these difficulties decrease. On Dix River, which enters the Kentucky at Highbridge, there appears to be an opportunity for the development of hydro-electric power in large amounts. The stream for the last twenty-five miles of its course is in a deep gorge of limestone. It is proposed to build a dam two miles above the mouth, 250 feet high, to provide a reservoir. The steep walls of the gorge will prevent overflow except where small streams come in from the sides. A power house would be an integral part of the dam, and the available power is calculated to be 40,000 horse-power and 131,400 K. W. hour output. The market would be all of central Kentucky, with air-line distance to Louisville, forty-seven miles; to Cincinnati, ninety miles. (Kentucky Geological Survey, Series IV, Vol. I, pp. 69-71.)

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CHAPTER II

RIVER IMPROVEMENTS

The rivers of Kentucky, unlike the roads, received no attention from the State of Virginia, except that mill-dams[A] and ferries were instituted and controlled. A number of ferries[B] were established on the Kentucky River by special acts of the Virginia legislature.

Kentucky assumed the jurisdiction of streams within its borders in 1792 when it became a State,[C] and maintained its

[A]From the beginning of settlement in Kentucky, a law was in force which prohibited artificial obstructions to the passage of fish or boats on navigable streams. (W. W. Hening, The Statutes at Large of Virginia, Vol. VI, p. 7.) Dams furnishing power for grist-mills or other works of public utility were allowed, provided these were built with locks and slopes. (Hening, Vol. XII, p. 187.) In the absence of bridges, moreover, a road law required the dams to be at least twelve feet wide with bridges over their pier-heads and flood gates. The county courts were vested with the authority to declare streams navigable and to grant the right to erect dams. (Hening, Vol. XII, p. 179, Vol. VI, p. 67.) According to Collins (Vol. I, p. 514), the first mill-dam in Kentucky authorized by the courts was built in 1783, on Dix River of the Kentucky. Shortly before the separation from Virginia, many streams were used for navigation and the orders of the court allowing the construction of mill-dams were often contested, and petitions were sent to the legislature praying for reversals. (Petitions of the Early Inhabitants of Kentucky to the General Assembly of Virginia, by James Robertson, Filson Club Publications No. 27, pp. 17-19, 144-153.)

The improvement of streams was also relegated to county courts, which were empowered to levy taxes and employ labor for open channel work. Where streams could not be improved in the ordinary way, special acts of the legislature were passed and the work was placed in the hands of commissioners. In a number of early petitions to the legislature inhabitants of Kentucky referred to the difficulties of communication by land and requested the improvement of waterways. (Robertson, pp. 144-150. For Virginia laws, see Hening, Vol. IV, p. 111, Vol. VI, pp. 68-70; Littell, Laws of Kentucky, Vol. II, Appendix, p. 582.)

[B]There were nine ferries established in Kentucky by special acts of the legislature. Two of these were on the Ohio, near Louisville (Hening, Vol. XII, p. 83), and one was on the Cumberland River at the crossing of the Wilderness Road (Littell, Vol. III, p. 582). The remainder were on the Kentucky. (See pp. 49-51.)

[C]By act of December 15, 1792, entitled "An act more effectually to prevent obstructions in watercourses," the Virginia law was adopted by the Kentucky legislature, on the grounds that it would tend greatly to the ease and convenience of the people of the State, that navigable rivers and creeks "be kept free and open for the passage of fish and the transportation of the growth and produce of

authority[A] over the Kentucky River until 1880. During that period a number of improvements were undertaken.

STATE IMPROVEMENTS, 1792-1880

OPEN CHANNEL WORK

The first projects were comprehensive schemes to secure by open channel work safety of navigation on the main river and the South Fork.

In 1792, and again in 1795, projects for "opening" the navigation[1] were discussed in the legislature[B] and July 22, 1799,

this country." Transgressors of the law were to be fined two dollars for each twenty-four-hour obstruction by fish dam, slope, stops, weir, hedge, or any other obstacle. Dams furnishing power were allowed, provided they were constructed in conformity with the Virginia law. (Littell, Vol. I, pp. 121-122.) The law was re-enacted with slight changes, February 22, 1797, and again February 10, 1816, and February 24, 1834. (Acts of Kentucky.)

[A] February 10, 1816, the Virginia law for the improvement of streams was adopted with modifications. The law was similar to that for the improvement of highways. The county courts were authorized to "lay off" navigable streams into precincts and to appoint overseers to superintend the improvements. The work was to be accomplished by "male laboring tithables" living nearest to the stream, who were to be allotted to the overseer in sufficient numbers to remove the obstructions, and who were exempt from road duty during the year that they worked upon the streams. Delinquents were to be fined the same as those who failed to work on the highways, one-half the sum to go to the stream and one-half to go to the overseer. (Littell, Vol. V, p. 391.) Before the enactment of this law a number of special acts had been passed for the improvement of individual streams, the State acting through the county courts or commissioners. This practice was continued. The funds were provided for by the State in the same manner as for highways—by county levy; lottery; tolls; private subscriptions in "money, labor, property"; appropriations from the treasury made directly or through taking stock in private companies. (Verhoeff, The Kentucky Mountains, pp. 43-48.) In 1818 there was an attempt to provide for an annual expenditure from State funds for the improvement of the principal streams, but the appropriations were made for only one year. (See p. 23, Note A.) In 1835 a general policy for the improvement of streams and highways was adopted by the Board of Internal Improvement, which succeeded a temporary board appointed in 1828. Thereafter, all important work was accomplished under the direction of that body. (Verhoeff, The Kentucky Mountains, pp. 48-54.)

[B] A bill introduced into the House, December 7, 1792, contained a resolution that the obstructions in the Kentucky River ought to be removed by the male laboring tithables living within five miles of the river under the direction of overseers to be appointed for the purpose. The resolution was to be referred to the committee appointed to present the bill. (Kentucky House Journal, 1792.)

at a convention[A] assembled to draw up a new constitution, a report of a survey of the river and plans for improvements were presented,[1] but no action was taken in any case.

December 19, 1801, "The Kentucky River Company," a joint-stock concern, was chartered by the legislature. The capital stock, $10,000, was to be subscribed in shares of fifty dollars by the various counties contiguous to the river, under the direction of commissioners appointed by the State. The company[B] was authorized to clear the Kentucky from its mouth to the mouth of South Fork of all barriers which the commissioners judged would "impede or obstruct the passage of boats," and of such other hindrances the removal of which would be "absolutely necessary to improve the navigation of the river." A fine[C] was to be imposed for any further obstruction of the stream, and the right to collect tolls[D] was granted to the company.[1]

The State appointed prominent citizens in the different counties as commissioners, but no work was accomplished.

[A]Martin Hawkins, a resident of Frankfort, presented a survey of the river between the mouth and Frankfort, exhibiting each rapid in its extent and descent. The total fall was estimated at forty-nine feet four inches, broken into seventeen falls of unequal length. An expenditure of $1500 was recommended on this section. It was proposed that the river from its mouth to its source should be cleared of obstructions by a total expenditure of $10,000. For the prosecution of the work a company already organized was to advance $1,000 annually for ten years, receiving its pay in State land at the rate of fifty dollars per hundred acres. Tolls were to be exacted which together with water-power at locks would reimburse the State within a century. The Virginia and Pennsylvania systems of improvement were compared. (For text of survey see Appendix, p. 222.)

[B]When seventy-five shares had been subscribed the commissioners, through the newspapers, were to call a meeting at Lexington of the stockholders for the purpose of electing a president and seven directors. From the date of the meeting the subscribers, their heirs and assigns were by the act declared incorporated into a company. The State reserved the right, after twenty-five years, to refund the capital stock of the company and to render its powers and privileges void. (Littell, Vol. II, pp. 453-454.)

[C]The penalty was two dollars for each twenty-four-hour offense after the passage of the act. (*Ibid*, pp. 453-454.)

[D]The following tolls were allowed, subject to the approval of two non-shareholding commissioners appointed by the governor, who were to examine the

According to Collins, the historian,[4] "the undertaking seemed too great for even such a substantial body of men, and after nine years of continued losses from obstructions another favorite paper-plan was set on foot by an act of January 10, 1811." This act allowed a lottery whereby $10,000 was to be raised. The money was to be expended by eleven men appointed by the State, on the main river to the mouth of South Fork, and on South Fork, itself, and its chief tributary, Goose Creek, as far as the salt-works of James Garrard and Sons in Clay County. The streams were to be cleared of logs, brush, trees, rock, and fish-traps; the points of islands were to be "shrubbed," and all other impediments removed.[5] The following year, and again in 1813, commissioners were appointed[A] and three years extension of time granted in which to complete the work, but as before, nothing was accomplished.[6]

Until 1818 no further attempt was made to improve the river as a whole, but there was legislation in regard to sections of it[B] and to its branches, especially within the coal field where

navigation annually in July or August, receiving from the company one dollar and fifty cents per day for such service:

Boats, maximum width 14 feet, length 30 feet	$4.00
Boats, maximum width 14 feet, length 45 feet	5.00
Boats, maximum width 14 feet, length 60 feet	6.00
Additional length per foot	.09
Keel boats, perogues, or canoes, over one-ton burden, per foot in length	.125
Hogsheads, pipe staves, headings, per 100 (rafted)	.04
Plank or scantling, per 100 feet (rafted)	.04
Other timber, per 100 cubic feet (rafted)	.125

A maximum of three-fourths the rates could be exacted from boats loaded with household furniture, coal, lime, iron, or other ore.

The evasion of toll would mean confiscation of boats and cargoes by the collector; assisted, if necessary, by a guard to be obtained by application to the justice of peace. (*Ibid.*)

[A]Commissioners were to receive two dollars a day; the total sum for services was not to exceed $500. (Littell, Vol. IV, p. 318.)

[B]December 17, 1803, Martin Hawkins was authorized to improve the river at his own expense near Fish Trap Island below Frankfort. The western channel was to be cleared of obstructions and a width of thirty feet maintained. At the upper end of the island a dam was to be built across the eastern branch of

need had arisen[A] for the transportation of salt from the heads of South Fork[B] and of iron from Red River.[C]

For twenty-five years, therefore, State legislation effected no improvement worthy of the name. On the contrary, county courts and special acts of the legislature allowed an

the river. This was to be of sufficient height to turn the water into the western channel and render safe the passage of ascending and descending boats at navigable stage. Hawkins was required to pilot boats and vessels from Frankfort to Lee's Creek for one year. In compensation he was allowed to erect a "water-works" on the eastern bank of the stream and to maintain same as long as navigation was not impeded. (Littell, Vol. III, p. 122.)

In the "Navigator" of 1811 is noted: "A mile below Frankfort there is a saw and grist mill in the river, which, in low water does a good deal of business; but it is not uncommon to see it completely covered by the floods of the river, to withstand which it has no roof, is open on all sides, and is heavily loaded down on the corners and in the middle of the frame at the top with piles of stones. The mill is owned by Mr. Hawkins. Boats pass through it as a chute, by lifting a few boards at its head, which when replaced form a dam for the mill." (Quoted in Collins, Vol. II, p. 244.) By act of January 29, 1813, the owner was given nine months in which to remove the dam and mill, which were obstructions to navigation. (Littell, Vol. V, p. 37.)

February 10, 1816, three commissioners were authorized to clear the Kentucky River near Frankfort (from the steam mill in Frankfort to Lee's and Taylor's warehouse) of all obstructions to either ascending or descending navigation. Subscriptions aggregating $6,000 could be collected for the purpose, but tolls were prohibited. (Littell, Vol. V, p. 390.)

[A] See pp. 151, 159.

[B] By act of January 8, 1810, Daniel Garrard, John Bates, and Beverly Broaddus were appointed commissioners to raise subscriptions in money, labor, or property for clearing and keeping in repair the navigation of South Fork and Goose Creek to the salt-works of James Garrard and Sons. A fine of five dollars for each twenty-four-hour offense was the penalty for further obstruction of the stream. (Littell, Vol. IV, p. 94.) By act of January 10, 1813, commissioners were authorized to raise by subscription $2,000 in money, labor, or property to open and keep in repair the navigation of Red Bird Fork of Goose Creek from the mouth to John Gilbert's salt-works. Further obstructions were prohibited under penalty of twenty dollars for each twenty-four-hour offense. (Littell, Vol. V, p. 149.)

[C] By act of December 4, 1805, Red River, from its mouth to "Clark's and Smith's Iron Works," was to be kept open for the navigation of boats and "other vessels." A fine of four dollars for each twenty-four-hour offense was prescribed for further obstruction of the stream. (Littell, Vol. III, p. 249.) February 4, 1817, the height of a dam erected by the Red River Iron Works was allowed to be maintained and the proprietors were authorized to add a "splash board" for increasing the head of water during the dry season, provided this did not impede navigation. (Acts.)

Red River heads against the Licking in Wolfe and Magoffin counties and enters the Kentucky near the Estill-Powell County line. It is navigable for barges and rafts for seventeen miles above the mouth. The iron works were located near Clay City, Powell County. (See p. 159.)

increase in the number of mill-dams[A] and public[B] ferries, both of which hindered general navigation.

A committee appointed to investigate the navigability of water courses, in its report to the Senate made December 21, 1816, included the Kentucky among the four rivers of greatest consequence to the State. The Senate recommended the appointment of a commission to examine the river from its mouth to the "upper point" of navigation, and to render an account of the obstructions and the amount of commerce carried on.[7] January 28, 1818, $10,000 was allotted to the Kentucky out of the State appropriation for waterway[C] improvement.[8] The river was divided into three "precincts," and each placed under a commissioner.[D] By the close of the year about $7,000

[A]The control of mill-dams was left almost entirely to the county courts. The few established by State acts were built according to specific directions. For example, December 17, 1806, David Sutton was authorized to erect a grist-mill on the main river, at Todd's Ferry in Mercer County. The act provides that the "works of said mill shall not extend more than twenty-four feet in the said river from the edge of the stream when the water is at the ordinary height; that the dam shall not exceed two feet in height, and shall not extend into the river further than one-third of the width of said stream when the water is at such a height as to admit the passage of boats; that a gap shall be left open in said dam, or a passage around it, through which perogues, canoes, or other small craft may conveniently pass at low water; and that said mill or mill-dam shall in no wise injure the navigation of said river." (Littell, Vol. III, p. 355.)

[B]The Virginia custom of establishing public ferries by special acts of the legislature was continued by Kentucky (see Note A, p. 51). The county courts were accorded this right by act of December, 1796. The rates were fixed by the courts, as were also the number of boats and hands employed in the service. Public messengers were carried free of charge. The keeper of the ferry was exempt from county taxes, road duty, and other public services and he could be authorized by the court to maintain a tavern at the ferry. His rights were forfeited if the ferry was in disuse for two years. (Littell, Vol. I, p. 363.)

[C]By act of January 28, 1818, $40,000 was annually appropriated to the improvement of the Cumberland River below the Falls in Kentucky, and of the Green, Licking, Salt, and Kentucky rivers and the navigable tributaries thereof. (Acts.) Commissioners were appointed for the designated streams, and during 1818, $38,133 was expended. No other improvements were accomplished under the act and to prevent loss to the State, the spades, crowbars, and other tools purchased for the work were sold. (Kentucky House Journal, 1819-1820, p. 79.)

[D]As the first comprehensive improvement, the details are of interest. The lowest division, from the mouth to the "permanent bridge" (Frankfort), was in charge of Richard Taylor, who expended $2,215 in the removal of logs and debris and in the erection of "brush dams" in the form of wing-dams. Labor was hired by the day instead of the month as work was frequently interrupted by rises in the river or by backwater from the Ohio.

The section between the bridge and Jack's Creek (130 miles) was in charge

had been expended. The improvement extended up the main river to South Fork; up South Fork to the junction of Goose Creek and Red Bird Fork; and up each of these streams for about thirty miles to salt-works located on the banks. Obstructions were removed and in some places dams were built of rocks, brush, and logs, which, by narrowing the channel, deepened the water at low stages and in this way increased the safety of navigation.[9]

Between 1818 and 1835 a number of laws for the benefit of the river and the tributaries were enacted, but the work actually performed amounted to little.[A]

of John Yants, who employed twenty-five laborers and expended $2,774 in the removal of thirty-eight fish dams and a "vast" number of old trees washed into the river during floods, which floated with the current (sawyers), or were fixed by root and branch in sand and rock (planters). Further improvement was recommended by the construction of "short canals" and "wing dams" at the "worst ripples."

The upper river was assigned to Daniel Garrard, who engaged thirty-seven hands and expended $2,242. On the main river overhanging trees were the chief obstructions removed since they interfered with navigation and the landing of boats at the various warehouses. On South Fork the greatest part of the work was in the "narrows" which Garrard describes as a stretch of seven miles of the "worst stream navigated by flatboats in the 'western country.'" Near the head a straight and "safe" channel was obtained by a cut of 200 yards long and 60 feet wide through a rock bar, the material removed being used for a dam. The most obstructed point, about one mile below, had previously been rendered navigable for boats by an expenditure of $500 donated by "salt-makers." A stone dam built at that time was replaced by one four feet high and twelve broad. Below the dam about one hundred pounds of powder were used for the excavation of rock. On Goose Creek between its mouth and the salt-works, twenty-five fish dams were removed. On Red Bird Fork, from its mouth to John Gilbert's salt-works, $200 was expended. (Reports of Commissioners, see Reference 1, p. 16.)

[A]February 10, 1819, the "Elkhorn Navigation Company" was incorporated to improve the navigation of Elkhorn Creek from its mouth to the forks, and its North Fork to Georgetown and its South Fork to Lexington. (Acts.)

January 7, 1824, Dick's (Dix) River was declared navigable, and dams were prohibited unless provided with locks affording convenient passage for large flatboats, 60 feet in length and wide in proportion; a maximum height of eight feet was allowed dams for waterworks. (Acts.)

In 1823, Buck Shoals, one of the most formidable obstructions below Frankfort, was improved by an expenditure of $300 in Commonwealth bank paper, for a wing-dam 322 yards long and two feet high. This assisted keel and barge navigation and a committee appointed to investigate the improvement recommended, January 5, 1825, that $6,000 be expended for similar dams at twenty shoals to render the river from Frankfort to the mouth, navigable at all seasons for batteaux. (Kentucky Senate Journal, 1824-1825, pp. 376-382.)

River Improvements

In 1835 another general improvement was undertaken. During the following decade over $8,000 was expended[A] by the Board of Internal Improvement on the upper river to supplement canalization on the lower section. Although sixty-five mill and fish dams were removed from the main stream between Frankfort and South Fork,[10] the greater part of the money was used upon the Three Forks for the benefit of the salt, coal, and timber industries which were shipping their products downstream in annually increasing amounts.

The improvements were designed especially to aid the salt industry. South Fork and Goose Creek were again cleared as far upstream as the salt-works at the junction of East Fork and Collins Fork, which unite to form Goose Creek near Manchester, Clay County. These streams, too, were freed of encumbrance to the salt-works on their banks.[11] North Fork was treated in the same way to the mouth of Leatherwood Creek,[12] in Perry County, where salt-works had recently been opened and were in successful operation. Upon Middle Fork, the removal of a "drift" at the mouth, which had been accumulating since 1817, was all that was attempted. This stream was less obstructed than the others,[B] and besides, neither the coal mines nor salt-works in its valley supplied more than a local demand.[13]

[A] Expenditures by the Board for open channel work are summarized as follows in the State Report: (Legislative Documents, 1847-1848, p. 723.)

North Fork	1837-1841	$3,497.00
South Fork	1839-1845	3,022.75
Main River	1837-1841	1,238.40

A number of small expenditures are not itemized. During 1835, $200 was expended on Middle Fork, and $500 on Middle Fork and North Fork "conjointly." (Senate Journal, 1835-1836, Appendix, pp. 37-38.) The contract for the improvement of Goose Creek tributaries called for $350 for East Fork and $283 for Collins Fork. (House Journal, 1838-1839, Appendix, pp, 76-77.)

[B] An act of November 7, 1821, had declared navigable North Fork to the mouth of Line Fork, which enters the stream just above the salt wells at the mouth of Leatherwood; also Middle Fork from the mouth to a point ten miles above Garrard's salt-works, probably near Cutshin Creek, Leslie County. The act did not prohibit fish dams, fish-traps, or mill-dams, and such obstructions were numerous. (Acts.) In the bends of North Fork there were masses of detached rock, 100 to 315

The State undertook no further work upon the river except within the coal field. February 26, 1868, an appropriation of $2,000 was made to Middle Fork for improvements between the mouth and Cutshin Creek. An act of March 1, 1869, authorized the expenditure of $5,000 on North Fork between its mouth and Brashear's Salt-works at the mouth of Leatherwood Creek. Sturgeon Creek,[A] which enters the main river a short distance below the Three Forks, was allotted $2,000 March 13, 1869.[14] By 1870 these various amounts had been spent[15] in clearing the streams for the benefit of the coal and lumber industries which were now of greater significance to the State than were the salt-works.

CANALIZATION

The first systematic survey of the Kentucky[16] was made in 1828, under the direction of the War Department of the Federal Government, at the request of the State.[B] It covered the section of river between the mouth and Boonesborough, a distance of about 178 miles. The detailed map drawn of this

cubic yards above low water, which during a boating stage caused swift currents. The lightest canoe could not navigate sections of the stream. (Kentucky House Journal, 1835-1836, Appendix, p. 37.)

[A]The work was accomplished under commissioners. Those appointed for North Fork were directed to report to the Breathitt County court, and those for Sturgeon Creek to Owsley County. (Acts.)

[B]By act of Congress, April 30, 1824, the Secretary of War was authorized to grant assistance to the various states for works of internal improvement. (U. S. Statutes at Large.) February 11, 1828, the Kentucky Board of Internal Improvement was directed by the legislature to request a survey by competent engineers of the Licking, Green, and Kentucky rivers. If this assistance was not granted, one Judge Bates, who was "experienced" in the navigation of the stream, was authorized to do the work for a sum not exceeding $3,000. (Acts.) The services of engineers from the War Department were granted and $1,200 appears to have been expended by the government for stationery and instruments; but all other expenditures were met by the State. (Correspondence between the Department of War, Lieutenant Turnbull, and the Governor of Kentucky: No. 7, Miscellaneous Letters, Office Chief of Engineers, Washington. "Letters Issued," Vols. III, IV, Internal Improvement, Office of Public Documents, Washington.) Further assistance for the Kentucky River was refused by the government. (Acts, January 31, 1833.)

stretch showed the location of each ripple, its nature and distance from the mouth.[A] The object of the survey was to determine the relative merits of canalization and regularization, and to obtain Federal aid in the prosecution of improvements. The report[17] to Congress, January 6, 1829, recommended the building of an experimental dike near Frankfort at a cost of $10,704. If found successful, it was to be the first of a series of dikes and wing-dams extending to the mouth. The recommendation was not adopted.[B]

An examination of the upper river by the State Board of Internal Improvement between 1835 and 1838 supplemented the survey. The board advised a complete system of slack-water extending from the mouth of the main river to Middle Fork,[18] and up the Three Forks for a considerable distance.[19] On the main stream it would require seventeen locks and dams, at a cost of $1,950,868[C] to provide a six-foot depth, and make possible a continuous navigation for the medium-sized steamboats of 150-250 tons burden which were then used on the upper Ohio.

The reports stated that North Fork could be rendered navigable[20] for steamboats of eighty tons burden as far as Troublesome Creek, fifty-five miles, at a cost of $9,140 per mile,[D] or a total of $502,700.

[A]For map and report of survey, see Reference 1, p. 16. Copies sent to the governor of Kentucky were destroyed by fire. (Annual Report Chief of Engineers, U. S. A., 1879, p. 1407.)

[B]The dike, eight feet high and 450 yards long, was to have crossed the river above the mouth of Benson Creek. (Turnbull's Report.) A bill appropriating $10,700 for the improvement was passed by Congress, but was vetoed by President Andrew Jackson, who thereby increased his unpopularity in the State. (Lexington Observer and Kentucky Reporter, June 26, 1832.)

[C]To this was added for lock-houses, $17,000, for hydraulic lime, $102,000, for clearance of river banks ($300 per mile), $77,250, and for contingencies, employees, etc., $150,298, making a total of $2,297,416, or an average cost per mile of $8,922. (House Journal, 1836-1837, Appendix, p. 89, Table.)

[D]Referring to the section above Troublesome Creek, the report states that slack-water could be extended to Hazard or to the mouth of Leatherwood Creek

Middle Fork[21] was considered too narrow and crooked for steamboats, nevertheless slack-water was advised for sixty-eight miles to benefit "such boats as would be used for the conveyance of coal upon the Kentucky River," at a cost of $4,000 per lift, or a total of $750,000.

South Fork[22] could be made navigable for small steamboats as far as the junction of Goose Creek and Red Bird Fork, forty-two miles, by sixteen locks and dams at a cost of $1,099,746.[A]

The board pointed out that if these recommendations went into effect a connection between the slack-water system of the Kentucky and the Cumberland rivers could then be accomplished by building a canal[B] between Goose Creek[23] and Cumberland Ford (now Pineville).

at a total cost of $1,000,000 "if the business of the country should ever require it" but since the channel "is more crooked and not so wide and as the ascent is considerable, the pools between the dams would be short and the steamboats could not be used with advantage." A towing-path and boats propelled by horses would be necessary. (Kentucky House Journal, Appendix, pp. 73-77.)

[A]It was suggested that the first of a series of locks and dams be built at the foot of the "narrows" (see p. 16, Note B), at a cost of $68,520. Flatboats could then descend more frequently, as higher water by two feet was required for passing the obstruction than for the common ripples.

Goose Creek, 26.5 miles in length, was found "too narrow and crooked to be navigated by steamboats, and a towing-path would be required in order that boats might be propelled by horses' power." (House Journal, 1837-1838, Appendix, p. 53.)

[B](See p. 105.) The upper section of the Cumberland River is considerably higher than the channels of the upper South Fork tributaries from the Kentucky, and the divide is narrow with deep gaps. At some points tributaries of the two rivers flow from the same source. (Kentucky House Journal, 1835-1836, p. 87.) The line of thirty-eight miles surveyed for the canal required a lockage of 160 feet. It extended along Cumberland River to within a mile of Barbourville, thence up the valley of Richland Creek to the dividing ridge between its headwaters and those of Collins Fork and through the ridge by a tunnel of one mile, or a deep cut of forty feet at the summit; down Collins Fork to its junction with East Fork of Goose Creek. The route was practically the same as that of the old Manchester-Barbourville Road. (House Journal, 1837-1838, Appendix, pp. 54, 137-141.) Water could be diverted into the canal by a dam at the Pine Mountain gorge, where the steep walls of rock would permit a structure of great height without inundating the surrounding country. (*Ibid.*) An insufficiency of water during the dry season was anticipated on the sixteen miles from the junction of the canal with Collins Fork to Manchester. This stretch was so far distant from Pineville that it must depend upon Collins Fork for its water. A storage reservoir to be

Only that part of the plan which related to the main river was adopted. The work begun in July, 1836, was suspended in 1842 after the completion of the five lower locks, because of embarrassment in the fiscal affairs of the State.[24]

The opening of the five locks in December, 1842, brought into use ninety-five miles of slack-water, officially known as the Kentucky River Navigation.[25] Frankfort, however, only sixty-six miles above the mouth, became the head of the continuous steamboat navigation. At that point a highway bridge built at an early date,[A] and a railroad bridge com-

obtained by an embankment across a tributary ravine was recommended. There was no estimate of the cost of the canal. It could be extended through Cumberland Gap by a tunnel 700 or 800 yards long, the water to be provided by a storage reservoir on Yellow Creek. (House Journal, 1835-1836, Appendix, pp. 87-88.)

Connection with the Cumberland was also suggested by means of a canal between Goose Creek and Rockcastle River, and the route was surveyed. (Senate Journal, 1835-1836, pp. 408, 445, Appendix, pp. 60-61.)

[A]The building of a bridge at Frankfort was long delayed. The Frankfort Bridge Company, a joint-stock company, was chartered by an act of the legislature December 21, 1799, but the act was repealed December 21, 1805, as nothing had been accomplished, and an individual, John Pope, was granted the privilege of undertaking the work. (Littell, Vol. III, pp. 280-282.) By acts of the same year the privilege was also granted to Thomas Turnstall and John Brown (*Ibid*, pp. 311, 506), and again to the latter, January 31, 1812. (*Ibid*, Vol. IV, p. 350.)

In the meantime a new joint-stock company, under the same name as the former organization had been incorporated by act of January 25, 1810. The charter was granted on the grounds that other schemes had failed and that a bridge would facilitate the communication of many citizens with the capital and tend to improve the art of constructing bridges and encourage their erection in other parts of the country. The stock was not to exceed $30,000, divided into $100 shares, and commissioners were appointed to receive the subscriptions. Passage for travelers, carriages, horses, and cattle was to be afforded, and tolls specified in the acts were to be exacted by the company. The bridge, which was to be completed by February, 1816, was to contain but one pier in the channel with a minimum height of 65 feet. (Littell, Vol. IV, pp. 137-138, 350.)

In the "Navigator," of 1811, there is reference to the bridge: "The bridge now erecting at Frankfort will add facility to the commerce of the town; it is building on the plan of Judge Finley's chain bridge; will cost about $25,000, is 334½ feet span, having one pier in the middle of the river 65 feet in height; whole length about 700 feet, and 18 feet broad. The two chains for this bridge were made at Pittsburg, and weigh about twelve tons, of inch and a half square bar. There was much difficulty in getting a foundation for the western abutment, arising from a kind of quicksand and water rushing at bottom upon workmen as fast as they could discharge them at top with pumps and buckets worked night and day." (Collins, Vol. II, p. 243.)

Until the completion of this structure, a "floating bridge" supported by boats was in use. Cuming (Tour to the West, Thwaites, Vol. IV, p. 193) writes in 1807 at Frankfort: "The erection of a permanent wooden bridge over the Kentucky has been lately commenced which will be about one hundred and forty

pleted in 1851, were both too low[16] for the passage of steamboats during high water[A] though they permitted the passage of keel-boats which could ascend much farther throughout the year. The projected six-foot depth, moreover, was not attained because of errors in the placement of mitre sills so that the maximum capacity of boats was less than had been planned.[17]

Financially the project was not a success. Inferior material used in the construction of the dams necessitated constant repairs. The locks, injudiciously located, were liable to choke up in their approaches and the continual dredging necessary was expensive. Floods and ice, against which no works on the river have been able to stand unhurt, wrought numerous and costly catastrophes.[18] Tolls were demanded for lockage[B]

yards long from bank to bank, the surface of which is about fifty feet above low water mark. The present bridge of boats is about sixty-five yards between the abutments, and the river, now at low water, is eighty-seven yards wide."

Floating bridges were built at other places on the river and added to the difficulties of navigation. (Littell, Vol. V, p. 332.)

[A]After 1869, navigation during high water was further impeded by a railroad bridge near Worthville, eleven miles above the mouth. (Annual Report Chief of Engineers, U. S. A., 1897, Vol. III, p. 2537.)

[B]Navigation on the slack-water began during 1840, when Locks Nos. 2, 3, and 4, although incomplete, were opened and steamboats were allowed to pass without payment of toll. (Legislative Documents, 1841-1844, p. 231; *Ibid*, 1840-1841, p. 253.) A collector at Frankfort, appointed by the Board of Internal Improvement, received the tolls at that place and those collected by the various lock-keepers. (*Ibid*, 1841-1842, p. 245.) Toll at first was exacted only for freight and passengers at each lock, but later the boats even when empty, were taxed, and at a rate per mile from the mouth of the river to the head of slack-water, near the mouth of Clear Creek (McCoun's Ferry). By an act of the legislature, February 17, 1847, boats and rafts descending the river from above the head of slack-water were exempt from toll. (Acts.)

The tolls for 1842-1843 were fixed as follows:

	Per Lock
Freight per ton, by boat, descending	10 cents.
Freight per ton, by boat, ascending	15 cents.
Cabin passengers, per lock	6¼ cents.
Children, servants, and deck passengers	Half fare.
Livestock	3¼ cents.
Household furniture, carriages and other shipment by lot	5% of transportation rate.

(Legislative Documents, 1843-1844, p. 476.)

and the receipts[A] for a time more than balanced the cost of maintenance and operation, but deficits[B] soon became common and the dividends on invested capital were insignificant. The construction of the five locks and dams cost $901,932.[C] During a period of twenty-four years, from 1843 to 1866,

[A]The rates were changed at various times. Those put into effect January 11, 1852, indicate the complexity of the system employed.

	Per Mile
Ascending freight, per 100 pounds	½ mill.
Descending freight, per 100 pounds	½ "
Cabin passengers over 12 years	5 "
Children, servants, and deck hands	3 "
Horse, mule, jack, jenny, cattle	5 "
Hogs, sheep	2 "
Beef, pork, lard, per barrel	2 "
Liquor, per barrel	3 "
Dry barrels	1½ "
Wet barrels (salt, fish, etc.)	1½ "
Lard packages	½ "
Sacks of corn or wheat (2½ bushels)	½ "
Utensils and goods shipped by lot (household and kitchen furniture, etc.) ascending	6% of transportation rate per lock.
Utensils and goods shipped by lot (household and kitchen furniture, etc.) descending	4% of transportation rate per lock.
Tobacco, per hogshead:	
Lock 1	30 cents.
Lock 2	15 "
Lock 3	10 "
Lock 4	6 "
Lock 5	4 "
Rafts of timber, per linear foot, per lock:	
15 feet and less wide	3 cents.
15-20 feet wide	2 "
40 feet wide and over	5 "
Steamboats, lockage per lock	$2.00
Flatboats and keel-boats, empty, per linear foot per lock	3 cents.

(Legislative Documents, 1851-1852, pp. 740-741.)

[B]During 1842-1843, $7,852 was collected and in 1847, $49,638. There was a gradual decline until 1850, when the decrease became marked, although the rates were increased. In 1854 the revenue was only $7,646.96. Between 1854 and 1867 the amount varied, but never attained a large sum; the maximum collection during that period was $17,400.99 in 1864. (*Ibid*, 1866, Vol. II, Document 12, p. 44.)

[C]The average cost per mile was $9,494, at which rate the system completed to Middle Fork would have cost $2,444,705. The increased expense was due

the receipts[A] amounted to $472,620, and the expenditures to $314,489. The net revenue of $158,125, therefore, represented an average annual return of $6,872, or a fraction of one per cent. per annum on the investment. The State, burdened with debt and practically limited by the constitution of 1850 to receipts from the commerce[10] for its expenditures upon the river, neither extended the system as planned, nor maintained properly the works already in existence.

Various joint-stock companies attempted to continue the work begun by the State, but they met with no success.

In 1847 the legislature considered seriously a scheme to extend the slack-water to the Three Forks with funds to be raised by county subscriptions and with labor to be supplied by State convicts.[10]

January, 1852, "The Kentucky River Navigation Company," with a capital stock of $600,000, received a charter and permission to open subscriptions for the building of locks and dams to complete the system. Work was to commence within two years, and unless finished by January 1, 1861, the charter would be forfeited.[11]

In 1865 another company under the same name received a new charter, and pledged itself not only to extend the system

in the main to scarcity of labor, and consequent high prices; and also to the extended period of construction—nearly seven years. The works often sustained great damage from floods and other causes, while there were numerous unnecessary expenses incidental to delay, suspensions, and failures. If the work had been executed promptly, the expense would probably have been within the original estimates. The timber and stone used in the construction was obtained in the immediate vicinity of the works. The hydraulic lime was brought from outside the State, but for the works above Frankfort, it was planned to manufacture this from rock exposed along the river at various points as high as Red River. (George Stealy, Report of Examinations made for Hydraulic Lime on the Kentucky River, House Journal, 1837-1838, Appendix, pp. 175-176; Reports of Board of Internal Improvement.)

[A]The engineers had anticipated an income from the rent of water power—at least $3,450 at each lock—but the actual income from that source was insignificant. (Kentucky Senate Journal, 1835-1836, Appendix, p. 18; House Journal, 1835-1836, p. 63.)

but also to maintain and operate the works built by the State.[A] The counties which would be benefited by the new works were to subscribe for stock in the company, and the funds for the extension were to be raised by county taxes levied by popular vote.[33] By May 1, 1869, eight of the ten counties had voted favorably, and $700,000 had been subscribed. In order that the company might fulfill its obligations the State improvements on the river were leased to it for a period of fifty years at $1,500 annual rental. The lease was authorized by an act of the legislature February 24, 1869. Unfortunately the company failed, and the State Court of Appeals soon afterwards declared the county subscriptions unconstitutional, so that, although moneys had been paid over to the company and expended, no extension of the works resulted.[33]

The slack-water was used during the Civil War, but it deteriorated greatly from lack of proper care.[34] After 1876 the works were practically abandoned[B] and regular navigation stopped. By the close of the period the entire system, except the locks, which were substantially built, was worthless.[35] The pools were filled with debris, the two lower dams were in ruins, and the rest were rotten from comb to foundation.

FEDERAL IMPROVEMENTS, 1880

CANALIZATION

March 22, 1880, Kentucky conveyed to the United States jurisdiction over the works on the Kentucky River and the land adjoining with the understanding that the locks and

[A]All schemes proposed to the legislature were opposed by the representatives of the mountain district unless provision was made for the extension of the system up the forks to the coal mines. The Board of Internal Improvement, January 1, 1868, urged that the Kentucky River Navigation Company be given the right to place one lock at the mouth of each fork. (Legislative Documents, 1867, Vol. II, pp. 7-9; *Ibid*, 1866, Document 12, pp. 7-8.)

[B]The lease of the Kentucky River Navigation Company was annulled March, 1876. (Governor's Message, Kentucky House Journal, 1877, p. 47.)

dams should be repaired and operated free of tolls, and the slack-water extended into the mountains as originally planned.[16]

Thus, in 1880, the Federal Government resumed the work which the State had been forced to abandon.

Three years before, in 1877, an engineer of the War Department had investigated the condition of the five locks and dams and estimated the cost of necessary repairs.[A] In compliance with a river and habor act of 1878 the upper river and the Three Forks had also been examined. The report[17] of the surveys recommended an expenditure of $1,074,402 for the repair of the five old works and the construction of twelve new locks and dams,[B] which would extend slack-water to the mouth of Middle Fork; the continuation of slack-water up North Fork[C] for 121 miles[D] by the construction of twenty-one locks and dams at a cost of $1,386,000, up South Fork and Goose Creek for sixty-nine miles[E] by fourteen locks and dams at a cost of $968,000, and up Middle Fork for sixty-eight miles[F] by thirteen locks and dams at a cost of $786,000.

The report emphasized the feasibility of the old plan of

[A]The investigation was made under a contract with the commissioners of the Sinking Fund of Kentucky, and according to instructions from the governor. (For the report in full see Report of Chief of Engineers, U. S. A., 1879, Part 2, pp. 1407-1410.)

[B]For the repair of the old locks and dams, $84,802 and $989,600 for construction of twelve new works. (*Ibid*, p. 1399.)

[C]The improvement of North Fork was considered of greater importance than that of other mountain streams, as it was the richest in timber and coal resources, and drained the largest and most densely populated area. The slack-water, moreover, would form a link in a railroad and water line communication between the Virginia seaboard and the city of Louisville which would probably be built in the future. (*Ibid*, p. 1403.)

[D]To the mouth of Leatherwood Creek. Above that point the stream, as in the State surveys, was considered too crooked and narrow for locks and dams. Storage dams to provide periodic navigation as far as Boone's Fork (38 miles) were suggested in behalf of the coal and timber interests, which were considered of sufficient importance to justify the necessary expenditure. (*Ibid*, p. 1400.)

[E]To Goose Creek Salt-works, near the mouth of Collins Fork. (*Ibid.*)

[F]To the crossing of the old Hazard and Manchester Road. (*Ibid.*)

connecting the Kentucky and Cumberland Rivers by a canal between the mouth of Collins Fork of Goose Creek and Cumberland Ford, and estimated the cost at $818,000.

March 3, 1879, a project was adopted, based upon the estimates given in the report, for the canalization of the river between its mouth and the junction of the Three Forks near Beattyville.[38] Work was begun[39] in May, 1880, and has been continued to the present time.

The plans in minor details have been often modified. In the current project[40] adopted in 1899 the number of locks has been reduced to fourteen. The original five have an available length of but 145 feet, and are only thirty-eight feet wide.[41] The new locks are fifty-two feet wide and possess an available length of 145 feet, with the exception of Number 6 and Number 7, whose lengths are 147 and 146 feet, respectively.[42] Up to Number 7 all the dams are of low lift and fixed type,[43] those above are high, and the ones near headwaters are provided with 6-foot movable crests.[44]

Work has been conducted upstream. Each lock, as soon as it is finished, becomes the head of regular steamboat navigation.[A] Progress has been slow. Between 1880 and 1885 the restoration of the original locks and dams was all that was accomplished. Four of these were opened March, 1882, affording eighty-two miles of slack-water.[45] The opening of the fifth in 1886, at Tyrone,[46] increased the amount to ninety-five miles. Number 6 was not completed[47] until 1891, and Number 7 not until six years later.[48] Since then the work has advanced more rapidly.[49] Number 8 was opened in 1900, Number 9 in 1903, Number 10 in

[A]The bridges at Frankfort and Worthville continued to obstruct steamboat navigation during high water until 1893, when by order of Congress, a minimum height was required for all bridges on the stream. (Report Chief of Engineers, 1883, Vol. II, p. 1560; 1893, Vol. I, p. 471; 1894, Vol. III, p. 2490.)

1905,[A] Number 11 in 1906, Number 12 in 1910, Number 13 in 1914, and Number 14 is in process of construction.

The system completed will provide a draft of five and five-tenths feet at mean low water from Lock Number 1 to the head near Beattyville. Until recently whenever the Ohio was extremely low only two and a half feet of water could be carried over the lower sill of the first lock which is located four miles above the mouth, but now that the dam has been raised across the Ohio at Louisville there will be a full six feet on this sill at all stages.[60]

The expenditures for the slack-water system have been much in excess of the original estimates on account of engineering difficulties encountered, which have proved greater than was anticipated. The old works required a virtual rebuilding. Flood and ice have interfered seriously with the construction of new works, and washouts and other damages have necessitated expensive additions for maintenance.[B]

According to the present calculations, the system when completed will have cost[61] $4,865;550. From March 3, 1879, to July, 1913, the annual appropriations amounted to about four millions ($4,196,150). From this sum disbursements have been made for the renovation of the old locks and dams, and have been or will be made for the construction of new

[A]Number 10 was completed January 12, 1905, but was closed in March when flood water cut new channels for the river behind both the new lock and Number 9, restoring the pools to the original condition. Navigation was reduced 43 miles. Rafts attempted to pass through gaps around the lock walls, but many were wrecked on the debris below. Number 10 was reopened December 22, 1906, and Number 9 November 23, 1906. (Report Chief of Engineers, U. S. A., 1907, Vol. II, p. 1786.)

[B]On account of the isolated condition of the works, it has been difficult to obtain labor and materials. The material has been brought chiefly from outside the State. Even timber, which, when the State works were constructed, was plentiful along the banks, has been brought by rail from the south. Some has been floated down from the mountains, but the supply from that source, depending upon the seasonal rises, has been intermittent and uncertain. (Annual Reports Chief of Engineers, U. S. A.)

works.[A] It is possible that no further appropriations will be necessary.[53] Additional sums granted the river annually since 1884[B] for maintenance have aggregated over two and a half millions ($2,798,328), and have been expended for the upkeep and operation of the locks and dams and their appurtenances and for the dredging and snagging necessary to the preservation of a navigable depth[53] on the slack-water section.[C]

During the decade 1882-1892, a part of the funds was wasted in an attempt to build an isolated work within the coal field.[D] In 1882 Congress set aside $75,000 of the annual appropriation to the Kentucky for the purpose.[54] The project, which provided for a lock and movable dam at Beattyville, was adopted at the solicitation of representatives from the mountains without preliminary reports from the War Department as to engineering possibilities or commercial demands.

After an investigation by a special board of engineers it was decided to build instead, at a cost of $115,412, a fixed timber

[A]Certain bridges and public roadways, crossing the small streams that enter the river, have been damaged by back-water from the dams. The United States has shared the losses, and a part of the appropriations has been utilized for reimbursements to the various communities affected. (Report of Chief of Engineers, 1913, p. 1034; 1912, p. 926.)

[B]Beginning in 1884 there have been annual allotments to the streams from the "Indefinite Appropriations for the Operation and Care of Canals and Other Water Works of Navigation." Previous to that time funds for the operation and maintenance of the work were taken from the general appropriation. (Report Chief of Engineers, 1913, p. 1036.)

[C]The original plans, like those of the State, anticipated an income from the lease of water-power at the locks. This has been realized at but one point. The Kentucky River Mills, a rope factory at Lock Number 4, pays an annual rental of $180 for the use of power. A hundred-year lease, dated July 10, 1878, expires July 10, 1977. Small amounts have also been derived from the rent of power above slack-water. (Report Chief of Engineers, 1909, p. 1854.) The power at Lock Number 4 is now continuous only eight months of the year, and sometimes for a less period. At flood stage of the river, the fall at the dam is eliminated and the wheels are out of commission, while during extremely low stages, all water available is necessary for navigation at the lock and steam must again be substituted.

[D]Further requests for the extension of slack-water into the mountains have been refused by Congress. The river and harbor act of March 4, 1915, authorized a preliminary examination of South Fork with a view to constructing an additional lock and dam in that stream, but the report of the Secretary of War was adverse. (Congressional Document No. 414, 64th Congress, 1st Session.)

dam with passes on the American bear-trap plan, which should provide a storage pool for coal barges, lumber rafts, and salt boats. It was expected that such craft would in this way be protected from ice and sudden rises while awaiting a favorable freshet.[55]

The dam was located below the mouth of South Fork between Beattyville and Proctor. Completed October 30, 1886, it proved unsatisfactory from the first on account of the great amount of drift in the river and the suddenness of the floods.[56] In the hope of overcoming these difficulties[57] a lock was decided upon, but before it could be completed a railroad entered the valley above Beattyville, and absorbed all traffic except that in loose logs. Since the transportation of logs on the river is hindered instead of helped by locks and dams, the work on the unfinished lock was suspended[58] February 25, 1891. The slack-water furnished by the dam and utilized for steamboat[A] navigation between the railroad and Beattyville was improved[59] somewhat, but the extension of the railroad to Beattyville soon afterwards, destroyed such usefulness as it had possessed. No further expenditure was made for maintenance of the dam after 1893, when the engineers recommended its abandonment on the grounds that it was a detriment to the logging industry.[60]

OPEN CHANNEL WORK

The only open channel work accomplished by the Federal Government was undertaken for the benefit of the coal field. Fifteen hundred dollars of the general appropriation was ex-

[A]The boats, operated by the Proctor-Booneville Transportation Company, ran ten miles up South Fork to Booneville, Owsley County. Extension of navigation a few miles up North Fork to timber mills seeking an outlet by rail, was planned by an addition to the Beattyville dam and the erection of wing-dams at the junction of Middle Fork where shoals prevented the passage of boats drawing less than two feet of water. (Annual Report Chief of Engineers, U. S. A., 1891, Vol. IV, p. 2455.)

pended on an eighty-mile stretch of the main river between Beattyville and the railroad at Ford. Snags, trees, and other obstructions were removed and the water concentrated over the bars by means of wing-dams. The object of the improvement was to provide a channel[A] at least sixty feet wide and three feet deep for nine months each year.[61] After the completion of the work, in 1885, it was possible to transport supplies upstream at a much lower water[62] stage. Nothing further has been done, although in 1886 the Chief of Engineers reported that the wing-dams needed repairs and recommended the expenditure of $2,000 at the shoals.[63]

There has been no work upon the Three Forks, and these streams and their tributaries are encumbered with mill-dams, trees, boulders, rocks, and shoals. North Fork, however, has been examined with open channel work in view. In 1879 the engineer estimated[64] that an expenditure of $10,000 would be necessary to clear the stream above the mouth of Leatherwood Creek of mill-dams which interfered with rafting. In 1883 an expenditure of $13,000 was urged for the excavation of a formidable rock barrier at the mouth of the stream.[65] In accordance with a river and harbor act of February 27, 1911, an examination of the Fork from mouth to headwaters was made to ascertain the practicability of removing the obstructions. The engineer reported against the undertaking because of recent railroad extensions in the valley.[66]

[A]The low water channel at that time was from thirty to fifty feet wide and the depths were very slight. (Annual Report Chief of Engineers, U. S. A., 1885, p. 1872.)

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CHAPTER III

THE BEGINNINGS OF RIVER COMMERCE

Commerce on the river began before improvements had been attempted and when Kentucky was yet a part of Virginia.

The population of Kentucky until the separation from Virginia was practically confined to the Bluegrass. The first immigrants were farmers to whom that region, covered with a luxuriant growth of wild clover, rye, grass, and cane, and with a forest abounding in game, especially appealed. Through the heart of the country flows the Kentucky, and with its tributaries between Frankfort and Boonesborough it drains broad rolling uplands capped with Lexington limestone.[A] Here the soil derived from the underlying formation is a fine-grained loam, rich and deep, having excellent moisture conditions because of the vast underground drainage system. Chemical analyses show this soil to be superior to all others within the State, and experience has proved its fertility.[1]

To this section of the river basin came the early travelers[B]

[A]The soils covering the 8,186 square miles known as the Bluegrass, where Ordovician and Silurian rocks form the surface (see Verhoeff, The Kentucky Mountains, pp. 4, 14) are, in general, very productive, although they vary greatly in this respect. Clay soils derived from the Eden shale (Ordovician) for example, are very poor and usually occupy hilly regions where they are subjected to rapid erosion. The Lexington limestone (Ordovician) is exposed in an area of 1,062 square miles, all of which, excepting a small section in Bourbon drained by the Licking River, is included in Scott, Franklin, Woodford, Mercer, Boyle, Garrard, Jessamine, and Fayette counties—territory drained by the Kentucky, and the center of the Bluegrass region. (Matson, Water Resources of the Bluegrass Region, pp. 30-33.)

[B]The point at which the Warrior's Path crossed the river, probably the mouth of Station Camp Creek, Estill County, 218 miles upstream, appears to have been considered the head of navigation by the earliest explorers. (Verhoeff, The Kentucky Mountains, pp. 61, 65.) This point was noted by Dr. Thomas Walker, May 23, 1750, as the mouth of Hunting Creek. (Johnston's First Explorations of Kentucky, p. 63.) Lewis Evans, in 1755, mentions the possibility of canoe navigation that far upstream. (Verhoeff, The Kentucky Mountains, pp. 64-65.) Cap-

and settlers[A] from the east, laboriously making their way over the transmontane roads and trails; or else they floated down the Ohio in boats and continued into the interior either up the Ken-

tain Thomas Hutchins, in 1766, describes the Kentucky: "Kentucky is a larger stream than the last (Licking River). It is surrounded with high clay banks, fertile lands, and salt springs. Its navigation is interrupted with shoals, but passable with small boats to the gap where the warpath goes through the Ousioto Mountains." (Topographical Description of Virginia, etc., London, 1778, quoted in Johnston, First Explorations, p. 62, note.)

It is possible that long before permanent settlements were established in the State, merchandise was shipped down the Ohio and up the Kentucky, and that peltries were sent down the river in canoes. (See p. 1, Note A.) Eastern firms had for years been sending goods suitable for the Indian trade over the mountains and down the Ohio to traders who exchanged them for furs and skins. (See p. 52, Note B.) In the autumn of 1752, John Finley descended the Ohio to the Falls in a canoe with three or four assistant voyageurs and a cargo of goods. At the Falls there were frequently temporary Indian encampments. Upon his return he met a company of Shawnees at the mouth of Big Bone Lick (Boone County), who accompanied him and transported his merchandise over an old trail up the Kentucky Valley to "Eskippakithiki," an abandoned Indian village in what is now Clark County. This town, situated on the Warrior's Path (Pownall-Evans Map, Verhoeff, The Kentucky Mountains, p. 62), at the crossing of Lulebegrud Creek, a branch of Red River of the Kentucky, was settled in 1745 by a band of Shawnees led by Peter Chartier, a half-breed French trader. For some time, it continued to be a meeting place for traders and Indian hunters, although, in 1748 it was abandoned by the Shawnees, who, put to flight by enemy Indians, descended the Red and Kentucky Rivers in canoes. They continued up the Tennessee and later established another trading post on the Cumberland at the present site of Nashville. (Draper's Manuscript Life of Boone; Hanna, The Wilderness Trail, Vol. II, pp. 240-241.)

[A]There have been recorded a number of instances of navigation about the time that the first settlements were founded. The McAfee brothers of Virginia, in the spring of 1773, descending the Kanawha and Ohio Rivers in canoes continued up the Kentucky, and in July reached Drennon's Creek, twenty-one miles above the mouth. Here, the river, "shut up by a stone bar," was abandoned for an Indian trail which was followed to Frankfort and across the stream to Salt River. (McAfee Journals, see Wood-McAfee Memorial, p. 433, also Collins, Vol. II, pp. 604-607.) The return to Virginia was overland by the Kentucky River trail to Pound Gap. (Verhoeff, The Kentucky Mountains, p. 71.)

In May, 1774, Captain James Harrod's company of adventurers of thirty-one men who founded the first permanent settlements in Kentucky, came down the Monongahela and Ohio Rivers in pirogues or canoes to the Kentucky, which they ascended to a mouth of a creek called from that fact, Landing Run (now Oregon, Mercer County), and thence continued overland to the present site of Harrodsburg on a tributary of Salt River. (Robert McAfee, Sketch of the First Settlement of Kentucky, Collins, Vol. II, p. 517.)

In April, 1775, William McConnell and seven companions came from the "Monongahela Country" of Pennsylvania and Virginia "down the Ohio River in a large canoe or periogue to the mouth of the Kentucky, up that stream to the Elkhorn region and there explored the country and made some improvements." The party started homeward the last of June, some of them by water. Others went "across the country and meeting them at the mouth of Lawrence Creek on the Ohio River, six miles below Maysville." (Collins, Vol. II, p. 176.)

According to Collins (Vol. II, p. 242): "Leestown, one mile below Frankfort,

tucky or over the land routes. From that time[A] to the present, it has been a center of population and wealth. Abundant crops of wheat, corn, tobacco, and hemp have been produced continuously without fertilization of the soil, and these with the pastures of bluegrass have made Kentucky famous as an agricultural region.

For their farms the people preferred the extensive plains of the uplands on both sides of the river to the limited bottoms of the river itself;[1] especially after many attempts to occupy the banks had been frustrated by the Indians who used the precipitous cliffs as hiding places and points of attack. Moreover, it was necessary to group the homes about a stockade or in a town which contained a fort for protection against the Indian.[B] Sites for dwellings were therefore usually selected in the open country

was the first spot settled by the whites (in Franklin County) and as early as 1775 was a kind of stopping-place or resting-place for the explorers and improvers from the Pitt or Monongahela Country who came in canoes down the Ohio and up the Kentucky to 'look out the land.'"

For other examples see Collins, Vol. II, p. 177.

[A]For a decade after immigration began in Kentucky there were few settlements beyond the limits of the Lexington limestone region. This was due not only to the fertility of the soil but to danger of Indian attacks from the north, which continued until Wayne's victory in 1794. Filson's map of 1784 shows fifty-two villages and eighteen scattered houses. One large group with Lexington as a center occupied the country between Elkhorn Creek of the Kentucky and the main river, and there were a few outlying stations on the South Fork of Licking. Another group included Danville, on a branch of Dick's River, a southern tributary of the Kentucky, and also Harrod's Town just across the divide on a branch of Salt River which at headwaters flows in the Lexington limestone. A third group stretched westward along the upper forks of Salt River and merged into the settlements along Beargrass Creek and the Falls of the Ohio, the only considerable group beyond the limits of the limestone. (Compare Filson's Map and the Geological Map of Kentucky.)

That the prehistoric Indians also selected these fertile plains as dwelling sites is shown by the remains of a large town in the vicinity of Lexington, Fayette County, and of another near Versailles, Woodford County. Forts, mounds, graves, and other remains are numerous in the basin of the Kentucky from the mouth to the mountain section. There are few within the mountain region. (Verhoeff, The Kentucky Mountains, p. 60, Note A.) For a list of the remains, see C. S. Rafenesque, Ancient History or Annals of Kentucky, 1824; Collins, History of Kentucky, Vol. II, pp. 392-393; Catalogue of Prehistoric Works East of the Rocky Mountains, Smithsonian Institute, Bureau of Ethnology, 1891.

[B]In 1779 the following instructions were sent to the various stations in Kentucky:

"At a court continued and held for the County of Kentucky, April the 7th, 1779.

where there was room for expansion, where springs were numerous and where the main trails connected the settlements with one another and with the east.

Boonesborough, however, the first town established in the State by an act of the Virginia Assembly, was located on the river. Its site at the mouth of Otter Creek near Ford, Madison County, was selected by Daniel Boone for Richard Henderson and Company as "the most convenient place for a town on the Kentucky River."[3] April 1, 1775, Boone and his road cutters arrived and built a small fort. They were followed by Henderson under whose direction a station or stockade known as Boonesfort[A] was erected. Later it was included in a town laid out by the proprietors. In 1779, the inhabitants, dissatisfied with the distribution of lots, sent a petition to the legislature asking that a town be established under the law then in force.[4]

"Ordered that the Clerk of the Court send to the several Towns and Garrisons at least one attested Copy of the following entry:

"The Court of Kentucky doth recommend to the inhabitants that they keep themselves as united and compact as possible one other year, settling themselves in Towns and Forts; and that they may for their greater encouragement procure therein a permanent property to the soil and improvements they recommend that the intended Citizens choose three or more of the most judicious of their body as Trustees who shall be invested with authority to lay off such Town with regularity, to prescribe the terms of residence and building therein, to adjudge adequate and just compensation to any person who may necessarily be aggrieved thereby and to determine all disputes among the Citizens in consequence thereof that they return to this Court to be recorded a fair plan of their Town with their proceedings as soon as may be," etc. (A copy from an old manuscript sent to the Falls, quoted by Reuben T. Durrett in Johnston's Memorial History of Louisville.)

[A] A rough picture of Boonesfort filled out from the original plan of it preserved in the handwriting of Colonel Henderson can be found in Collins, Vol. II, opposite p. 529.) The dimensions are not given, but allowing 20 feet as the average length of the cabins and intervening openings, the fort was about 260 feet long and 180 feet wide.

"The fort in which the inhabitants took refuge from the fury of the savages consisted of cabins, block-houses, and stockades. A range of the former commonly formed at least one side of the fort. Divisions or partitions of logs separated the cabins from each other. The walls on the outside were ten or twelve feet high, the slope of the roof being invariably inward.

"A few of these cabins had puncheon floors but the greater part were earthen. The block-houses were built at the angles of the fort. They projected about two feet beyond the outer walls of the cabins and stockades. Their

Accordingly,[A] by act of October, 1779, Boonesborough was "established a town for the reception of traders."[5]

Shaler, referring to Boonesborough,[6] writes: "The position was well taken. It was on the south side of the principal river of the State, sufficiently advanced to protect a large tract of country by receiving the blow of invasions, and not too remote to hope to maintain its connections with the base of supplies in Virginia and North Carolina. The settlements in East Tennessee defended this part of Kentucky from the Southern Indians."

At first commerce in the river basin was purely local except for merchandise[B] sent settlers from the east and occasional outbound shipments consisting chiefly of salt[C] manufactured at

upper stories were about eighteen inches every way larger in dimensions than the under one, leaving an opening at the commencement of the second story to prevent the enemy from making a lodgement under their walls. A large folding-gate made of thick slabs closed the fort on the side nearest the spring. The stockades, cabins, and block-house walls were furnished with ports at proper heights and distances. The entire extent of the outer wall was made bullet-proof. The whole of this work was made without the aid of a single nail or spike of iron, which articles were not to be had." (Joseph Doddridge, Notes on the Settlements and Indian Wars of Virginia. Tellsburg, 1824.)

[A]The law required 640 acres of land to be reserved for the use of settlers in towns until a representation was made to the Assembly. Under Henderson's direction, twenty acres had been laid off into lots and streets. The act of 1779 required fifty more acres to be used for the same purpose and the balance of 570 acres to be reserved as a "commons." Lots were to be conveyed to persons first making applications—subject to the condition of building within three years on each lot a dwelling house at least 16 feet square, with a brick, stone, or dirt chimney. Ten citizens of the District of Kentucky, among them Daniel Boone, were appointed trustees to settle disputes concerning the boundary of lots and to "establish such rules and orders for the orderly building of houses therein as to them shall seem best and convenient." The land, in fact, was vested in the trustees and their successors "in trust to and for the use and benefit of the inhabitants of the said town." (Hening, Vol. X, p. 134.)

[B]Filson, in 1784, writes: "Down this River (Ohio) great quantities of goods are brought and some are conveyed up the Kentucky Rivers, others on horseback or in wagons to the settled part and sold on an average at 100 pounds per cent advance." (John Filson, The Discovery, Settlement, and Present State of Kentucky, Imlay's Topographical Description, p. 314.)

[C]Salt was manufactured at the "licks" in central Kentucky soon after the first settlements were established. Drennon's Lick in Henry County was one of many sites in the lower Kentucky basin where manufacture was carried on, but none of these works were of importance when compared to four principal springs which were for many years the centers of the industry.

At Big Bone Lick, near the Ohio in Boone County, Collins (Vol. II, p. 52) says salt was manufactured by the Indians before 1756 and by the whites as late as

the various "licks," and of furs which were often taken in exchange for that condiment in neighboring regions.[7] The more valuable fur-bearing animals had probably been exterminated in central Kentucky before settlements were established after years of exploitation by Indians and by hunters from the eastern colonies[7] and the French posts in the west.[8] Within a decade after the founding of Boonesborough merchants in the Bluegrass were buying furs at a distance.[A] These for the most part were shipped over the transmontane routes[9] to the Atlantic ports and thence to Europe.

1812. The lower and upper Blue Lick Springs in the Licking valley, are noted by Collins (Vol. II, p. 654): "For a hundred years (since 1773) these springs have been known to the whites and for the first forty years of that time furnished much of the salt supply of northeast Kentucky. The upper Blue Lick salt-works in 1805 were fed by three pumps set in a spring from which flowed as much water as would supply 1,000 kettles." According to the same authority manufacture was more extensive at the lower spring where Daniel Boone and thirty companions had made salt as early as 1778. (*Ibid*, pp. 655-656.) "Good old Kentucky Salt," advertised for sale in Cincinnati, April 15, 1794, was probably from these works, brought down the Licking in canoes. (*Ibid*, p. 113.)

The most extensive manufacture was at Bullitt's Lick, near Shepherdsville on Salt River, twenty miles from Louisville. Jedidiah Morse in 1796 describes the works: "Bullitt's Lick at Saltsburg, although in low order, has supplied this country and Cumberland with salt at 20 shillings per bushel, Virginia currency ($3.33⅓), and some is exported to the Illinois country. The method of procuring water from the licks is by sinking wells from 30 to 40 feet deep; the water thus obtained is more strongly impregnated with salt than the water from the sea." (Quoted in Collins, Vol. II, p. 100.) This property finally came under the control of the Federal Government and was leased to various contractors. At one time there were 800 men employed at the works and fifty furnaces were in operation. (History of Kentucky, by Perrin, Battle, Kniffen, p. 228.)

[A] Louisville, at the Falls of the Ohio, was the depositing center, receiving peltries by river both from the north and south. Crevecoeur, a French traveler, in 1784 notes that the town contained merchandise brought down the Ohio from Pittsburg which contributed "to support the trade in skins from Venango and the peninsula of Lake Erie by the River Miami, Muskigum, Scioto, etc." Saint John De Crevecoeur, Sketch of the River Ohio and of the territory of Kentucky, August 26, 1784, translation by P. A. Towne, Louisville Monthly Magazine, Vol. I, p. 32, 1879.) Venango was one of the old French forts on the upper Allegheny. The following letters to James Massie (afterwards General Massie) from James Wilkinson indicate the extent of the fur traffic and the importance of the salt industry at Bullitt's Lick. The salt was shipped by packhorse or boated down Salt River to the various settlements in the Ohio Valley. Some of it was taken up the Cumberland River to Nashville, Tennessee.

Danville, December 19, 1786.

Dear Sir:—I beg you to proceed with all possible dispatch to the falls. You will call by the lick and urge the provision of the salt; and prepare some way of

As soon as the rough trails from the Ohio had been sufficiently improved to accommodate packhorse and wagon, they offered a safer and shorter passage to and from the settlements than the Kentucky, and the travel and traffic on the river for many years were insignificant. The river in fact was rather an obstacle than a means of transportation. It interposed a barrier between the local settlements and interrupted the overland routes to the Ohio and to the east. A petition[10] to the Virginia Assembly under date of May 1, 1780, from the inhabitants of the "north side of Kentucky River" begs that Kentucky County be divided by a line to begin at the mouth of the river and to extend upstream to the head of Middle Fork and thence southeast to the Washington line, that is the Kentucky-Tennessee boundary. It is set forth: "That the River Kentucky is

conveying it to the river. You will make the best of your way to Nashville and there dispose of it for cotton, beaver furs, raccoon skins, otter &c. You must always observe to get as much cash as you can. When you have completed your sales you will yourself move with the horses &c. by land and commit the other articles with the barge to Capt. Alexander with directions to him to proceed up to the falls; there secure the boat and property, and give me the earliest advice of his arrival by express or otherwise.

The goods which Capt. Alexander carries down to the falls, I wish you to exchange for horses or elegant high-blooded mares if you can get great bargains; otherwise sell them for cash, peltry, or cotton. When you receive the salt take care to have it measured in a proper honest way, with a spade or shovel and no sifting, &c. One Smith is preparing to go down with two or three hundred bushels from the lower lick. Endeavor to get off before him, and if you cannot, persuade him to stay for you; but you must not wait for him a moment as it will be your interest to arrive before him. You will remember you are going amongst a set of sharpers and therefore must take care of yourself. Write to me by every opportunity letting me know how you come on. Don't fail in this. God bless you and give you good luck.

Yours sincerely,
J. Wilkinson.

Fayette, 29th Dec., 1786—Friday morning.

Dear Massie:—I approve of your plan to go to the port with two hundred bushels of salt and sell for cash or furs but take no deer skins. Be sure to get as many otters as possible. Be cautious in your movements, guard against the savages coming and going and discharge your men the moment you get to the port. The only thing you have to dread is the ice. To be caught in the ice would be worse than the devil's own luck. Act with decision and dispatch in whatever you do. God bless you.

J. Wilkinson.

(Quoted in Collins, Vol. II, p. 370.)

rendered impasable half the year by high waters and is ever inconvenient and Dangerous by Reasons of its Craggy and precipitate Banks. Thus severed by nature from our felow Citizens of the Southside of the river and Compactly situated in a fertile Land where aditional adventurers bid fair for a farther population, your petitioners conceive themselves ripe for a separation and pray, ..."

During high water ferries were necessary although in dry seasons the river could be forded at certain points.[A] The important fords were at the mouths of tributaries where rocky detritus brought down in quantity formed traversable shoals and where the valleys opened paths through the steep slopes. As soon as local traffic attained sufficient volume to demand passage throughout the year ferries were established at the main crossings by acts of the legislature. In most cases privately owned boats which had been transporting passengers and commodities for some time were made public carriers upon the formal petition of their owners.

The first ferry was authorized by an act of October, 1779, to operate from Boonesborough. This town was the terminus of Boone's Trace, and the point at which the extension to Lexington crossed the river. Richard Calloway requested[11] permission to keep a "public ferry" from the "Town Land to the land of this state" since "from the first seating of This town both the inhabitants and travelers" had found it very inconvenient to cross the river "only in dry seasons in the summer time" and "both

[A] In its original condition the river at low water consisted of a succession of deep pools, varying from one-fourth of a mile to more than five miles in length, separated by rocky bars. In the majority of cases these bars extended from the bluff shore some distance into the river and disappeared under detritus brought down by a tributary on the opposite side. The shoals thus formed varied in length from one hundred yards to three-fourths of a mile. On the greater part of some of these surfaces there were at times not more than six or eight inches of water, while the pools contained ten feet. (Kentucky House Journal, 1835-1836, Appendix, p. 55.)

this town and country" had become "very popular" and "much resorted by travelers."

The act granting the request[13] reads in part:

"Whereas it is represented to this present general assembly that public ferries at the places hereafter mentioned will be of great advantage to travellers and others; Be it therefore enacted, that public ferries be constantly kept at the following places and the rates for passing same shall be as follows, ... at the town of Boonesborough in the County of Kentucky, across Kentucky River to the land on the opposite shore, the price for a man three shillings (fifty cents) and for a horse the same; the keeping of which last mentioned ferry and the emoluments arising therefrom are given and granted to Richard Callaway, his heirs or assigns so long as he or they shall well and faithfully keep same according to the directions of this act; and for the transportation of wheel carriages, tobacco, cattle, and other beasts at the places aforesaid, the ferry-keeper may demand and take the following rates, that is to say, for every coach, chariot, or wagon, and the driver thereof, the same as for six horses; for every cart, or four wheel chaise and the driver thereof, the same as for four horses; for every two wheel chaise, or chair, the same as for two horses; for every hogshead of tobacco, as for one horse; for every head of neat cattle as for one horse; for every sheep, goat, or lamb, one fifth part of the ferriage for one horse and for every hog one fourth part of the ferriage for one horse, and no more."

A ferry keeper who demanded or received more than the legal rates must forfeit to the party aggrieved the "ferriage," and pay a fine of ten shillings.

In 1785 three other ferries were established[13] and the rates were reduced.[A] At the mouth of Hickman Creek, now Camp Nelson, Jessamine County, the privileges were accorded James Hogan, who set forth in a petition[14] that at the "request and solicitations of a number of the inhabitants in the Kentucky District" he had "provided himself with a Boat, Hands, etc.,

[A]The rates were reduced to four pence for a man and the same for a horse, while wheel carriages, tobacco, and livestock were taxed in the same proportion as in the former law. (Hening, Vol. XII, p. 83.)

for the purpose of keeping a ferry across the river from the Lands of his own in Lincoln County to his lands in Fayette County at the mouth of Hickmans Creek where the public warehouses are ordered to be erected." An addition to the ordinary rates was asked since "the keeping of a Ferry across the Kentucky River will be attended with more trouble and inconvenience than is usual on Rivers of that size owing to its peculiar situation and its being fordable generally six or seven months of the year."

At the mouth of Jack's Creek, near Tate's Creek, Madison County, the ferry was granted to David Crews. His petition[15] stated that at the request of "sundry Inhabitants of the County of Lincoln and others" he had been induced to build a boat for transporting passengers across the river near the mouth of Jack's Creek, from lands of his own in Lincoln County to other lands which he claimed in Fayette County, to which place roads were then "clearing" and which was adjudged the most convenient crossing place on the Kentucky above Hickman's Creek.

At Stone Lick Creek, near Tyrone, Woodford County, William Steele became the incumbent. According to his petition[16] he had furnished himself with proper boats for the purpose of keeping a ferry across the river from lands of his own in Fayette County to a site supposed to belong to John Craig in Lincoln County, to which place a road was at that time "opening from Lexington."

In 1786 a ferry was established at Frankfort near the mouth of Benson Creek from the lands of James Wilkinson to the opposite shore, and another at the mouth of Dix River, now Highbridge, from the land of John Curd. The rates were the same as those prescribed[17] in the preceding year.[A]

[A]The number of ferries was increased soon after Kentucky became a State. By act of December 21, 1795, there was one authorized to operate from the town of

As population increased in the Bluegrass and farm acreage expanded, a market outside the region was sought for surplus products. High prices were offered in the eastern cities but carriage over mountain roads was impractical while transportation up the Ohio and overland from Pittsburg was so slow and expensive that it was unprofitable.

For some time the westerners had looked to the Ohio-Mississippi waterway as a possible route for freight to New Orleans where the Spanish carried on a sea trade with the east and with Europe. Flour[A] and merchandise from Baltimore and Philadelphia were brought in sailing vessels to that port which in return supplied coffee, sugar, and other commodities from the West Indies, skins and furs[B] from the "western waters," and

Preston at the mouth of the Kentucky to Port William on the opposite side. (See p. 76, Note C.) The rates were the same as those of the Virginia ferries in 1786. (Littell, Vol. I, p. 347.) By the same act another was authorized to cross the Ohio from Preston. December 22, 1798, a ferry was authorized to be established at East Frankfort, one mile above Frankfort at the ropewalks of Elijah Craig. The rates were the same as those at Frankfort and at Preston. (*Ibid*, Vol. II, p. 231.)

[A]Spanish authority over Louisiana was assumed in 1769, and the increased population due to the troops caused an immediate rise in the price of provisions. In that year flour sold for thirty dollars a barrel. (Deposition of Oliver Pollock, Wilkinson's Memoirs, Vol. II, Appendix, Deposition I.)

[B]Until 1763, when by the treaty of Paris Louisiana fell to Spain, troops, munitions, and supplies from France were transported from that point by keelboats to the posts on the Mississippi, Missouri, Illinois, and the western lakes. French traders, too, shipped furs and skins in canoes down the rivers to New Orleans and passed the Falls of the Ohio on the way. During Spanish domination in Louisiana, the voyageurs continued to bring furs from the Great Lakes down the northern tributaries of the Ohio to exchange them for the products of the South. The early hunters in Kentucky had sometimes sold their peltry to these traders (Collins, Vol. II, p. 84) and in some instances had themselves gone to the southern fur markets. There appear to be no records of such trips down the Kentucky but according to Collins (Vol. II, p. 417), June 6, 1770, ten of the "Long Hunters" from Virginia and North Carolina who had been in Kentucky for a year's hunt "built two boats and two trapping canoes, loaded them with furs, and bear meat and started down the Cumberland and Mississippi Rivers to the French fort, Natchez, and thence home."

The attempt of the English, from the close of the French and Indian War to the beginning of the Revolution, to divert the western furs to the eastern ports resulted in the shipment of large quantities of merchandise, saddles and other supplies down the Ohio to various trading posts. Furs taken in exchange were brought upstream to Fort Pitt. In the year 1766, Messers. Baynton and Morgan of Philadelphia, then the largest firm engaged in the Indian trade, sent a cargo

munitions from abroad.[18] During the Revolution large quantities of munitions were purchased here both by individuals and the United States[A] and shipped to the western settlements,[19] and successful "trading voyages" in flatboats loaded with produce were made from points as high as Pittsburg downstream to the southern market.[B]

At the close of the war produce bound for New Orleans began to descend the Ohio in greater quantities,[20] and goods were poled upstream to Kentucky[21] at less expense than they could

of goods from Fort Pitt to Fort Chartres (near St. Louis) which had been occupied by the English in the latter part of the preceding year. There were five heavily laden batteaux and one was in command of John Finley, who, in 1769, conducted Boone through Cumberland Gap into Kentucky. (C. A. Hanna, The Wilderness Trail, Vol. II, p. 235.)

[A]In 1776 Captain William Linn and George Gibson descended in a large boat from Pittsburg to New Orleans for military supplies and returned upstream in 1777 with a cargo of 136 kegs of powder which they transported by hand around the Falls. (Collins, Vol. I, p. 518.) Indian attacks prevented the general use of the rivers for this purpose. According to Collins (Vol. I, p. 20; Vol. II, p. 116) in October, 1779, David Rogers and Captain Robert Benham and seventy men were sent from Pittsburg to New Orleans for clothing and military supplies for the western posts. Returning with two "laden keel boats" they were attacked by Indians near the present site of Cincinnati and all but twenty men were killed.

[B]Many of the earliest commercial trips on the Ohio from Pittsburg to New Orleans were undertaken by men who subsequently settled in Kentucky. According to Collins (Vol. II, p. 358; Vol. I, p. 16) Colonel Richard Taylor and his brother, Hancock Taylor, in 1769, with Abraham Haponstall and others descended the rivers in a canoe from Pittsburg and returned to Virginia by sea. In 1782 (*Ibid*, Vol. II, p. 358) two French traders, Tardiveau and Honore, left Redstone Old Fort (now Brownsville, on the Monongahela) "in the commencement of a trade to New Orleans, which they transferred to Louisville and continued to the Spanish and French settlements of the Mississippi." Captain Jacob Yoder is also recognized as a pioneer in river commerce. The inscription on a tablet at his grave in Spencer County, Kentucky, states that "in May, 1782, from Fort Redstone on the Monongahela River, in the first flatboat that ever descended the Mississippi River, he landed in New Orleans with a cargo of Produce." (*Ibid*, Vol. II, pp. 352, 723.)

"This cargo Capt. Yoder sold to the Spanish Commandant at New Orleans for a draft on the Captain-General of Cuba. Havana was then the entrepot of the furs received from the Mississippi River, large quantities of which had accumulated there in consequence of the existing war between Great Britain and Spain; Yoder invested the proceeds of his draft in furs and hides which he took to Baltimore, making a profitable venture. He repeated the trip to New Orleans and the adventure in furs and hides; but this time was unsuccessful." (*Ibid*, p. 723.)

Such trips were common at this time. General Irvine wrote to General Washington April 29, 1782 (quoted by J. A. James, in the Proceedings of the

be brought from the Atlantic cities.[A] The settlers on the Kentucky River attempted to share in the trade. It was a hazardous experiment for the craft was frail, the route was long and encumbered, and there was constant danger of Indian attacks.

Moreover, Spain at this time was in the midst of negotiations with the United States regarding the right of free navigation on the Mississippi. The treaty of 1783 granted the unrestricted use of the stream to Americans but Spain contested the right as she had not been a party to the agreement and the territory on both sides of the lower river belonged to her. Heavy transit and port duties were exacted at Natchez and points below, the restrictions varying with the will of the intendant or

Mississippi Valley Historical Association, Vol. VI, pp. 240-241). "Since I came up I have given permits to ten boats for New Orleans and Kentucky loaded with flour. I believe none of them carried less than thirty tons. I am informed ten or twelve more are to be down on one fleet of a much larger size." (Butterfield's Washington-Irvine Correspondence, p. 202.)

"The Delewares have just delivered up some Prisoners which they took the 22nd March, navigating a large boat from Fort Pitt, loaded with three hundred Barrels of Flour on its way from (to) New Orleans. They report that several other boats were to follow, some of them larger and all loaded with flour for the same market." (Michigan Pioneer and Historical Collections, Vol. X, p. 575.)

[A] Filson writes in 1784:

"From New Orleans to the Falls of Ohio, batteaux carrying about forty tons have been rowed by eighteen or twenty men in eight or ten weeks which at the extent will not amount to more than five hundred pounds expence, which experience has proved to be about one third that from Philadelphia. It is highly probable that in time the distance will be exceedingly shortened by cutting across the bends of the river.....When the distance is shortened, which, I believe may readily be done, and the mechanical boats brought to their highest improvement, the expences of a voyage from New Orleans to the Falls of Ohio will be attended with inconsiderable expence. Now we know by experience that forty tons of goods cannot be taken to the Falls of Ohio from Philadelphia under sixteen hundred pounds expence; but by improvements on the Mississippi with the conveniences of these boats, goods can be brought from New Orleans to the Falls for the tenth part of that expence; and if they are sold at one hundred pounds per cent now when brought from Philadelphia at expences so great, what may the merchant afford to sell his goods at who brings them so much cheaper?" (Filson's Kentucky, Imlay, pp. 319-320.) The mechanical boats, Filson says, had been recommended by Charles Rumsey and James M'Macken to the government. They were to be of ten tons burden and to sail or be propelled by mechanical powers making twenty-five to forty miles a day against the current of a river and requiring but three men. The peculiar property of the boats was to "sail best in smart currents." (*Ibid.*)

order of the king.[23] The freight at times was taxed a quarter of its value and at other times more. "In 1783 the traders could go to New Orleans but in 1784 they could not. The next year the river was open again for a little while and then closed." When the navigation laws were violated, as frequently happened, the cargoes were seized and the owners were fined, imprisoned, and even discharged penniless to find their way home.[23]

The first shipment of consequence from the Kentucky was in the spring[24] of 1787, when General James Wilkinson, who had retired from the army to seek his fortune in the west, sent to New Orleans a boat loaded with tobacco, hams, and butter from the vicinity of Frankfort.[A] The Spanish authorities, at the solicitation of an acquaintance of Wilkinson, allowed a sale of the produce without exacting duty. The profits were high, especially on tobacco, which brought in Spanish money nine dollars and a half a hundredweight while it was worth but two dollars in Kentucky.[25]

Wilkinson, who arrived soon after his boat,[26] arranged with the Spanish officials a private trading treaty to be in force pending the settlement of the dispute between the two countries. The exact terms of the contract have never been discovered[B] but

[A]Wilkinson "embarked on Kentucky River in April, 1787, and after escaping many perils from the savages, he arrived at New Orleans in June." (Clark, Proofs of the Corruption of General James Wilkinson, Notes, No. 1, p. 4.) The dates are confirmed by Wilkinson (Memoirs, Vol. II, p. 109) but Spanish documents say that he arrived in New Orleans on July 2. (W. S. Shepherd, Wilkinson and the Spanish Conspiracy, American Historical Review, Vol. IX, p. 494.) He accompanied his cargo as far as Natchez, where he prevented confiscation. The commandant feared that superior authorities might wish to show "some respect to the property of a general officer." At this time all traders from the Ohio who "ventured on the Mississippi had their property seized by the first commanding officer whom they met and little or no communication was kept up between the countries." (Wilkinson's Memoirs, Vol. II, Deposition VI.)

[B]According to Wilkinson, a permit obtained in 1787 allowed him to introduce to the market of New Orleans, thirty-five thousand dollars worth of Kentucky produce. This document he unfortunately destroyed, but he preserved a second permit dated August 8, 1788, forwarded to him in Kentucky.

"I, Don Stephen Miro, Colonel of the Royal Armies, Political and Military Governor, and Intendant General of the Provinces of Louisiana and West

he was granted the right to make shipments to the port, the government guaranteeing him a market for tobacco and flour.[27] He was also privileged to import[28] sugar and other commodities and to ship them upstream.[A]

From New Orleans, Wilkinson, in September, went by sea to Charleston[29] and thence to Philadelphia and on to

Florida and Inspector of the Troops, etc., Grant free and full permission to the American Brigadier, Don James Wilkinson, settled in Kentucky, to direct or cause to be brought into this country by inhabitants of Kentucky one or more launches belonging to him with cargoes of the productions of that country:- Therefore, I command all officers belonging to this government not to offer any hindrance to his voyage: on the contrary, they are to render him every assistance that may be necessary. The present is given, signed with my hand, sealed with the seal of my arms, and countersigned by his Majesty's secretary for this government, in the City of New Orleans the 8th of August, 1788." (Wilkinson's Memoirs, Vol. II, pp. 115-116.)

The specific sanction of the home government was required for a grant of commercial privileges to a foreigner so that only the latter permit was legal. Spanish documents show that the first permit granted September 6, 1787, authorized Wilkinson to import from Kentucky a consignment of tobacco, negroes, cattle, swine, and apples which he in his Memorial to the Spanish government had suggested should be sold and the proceeds held by the governor as a pledge of his "good conduct" until the "issue of our plans is known or I have fixed my residence in Louisiana." (W. R. Shepherd, Wilkinson and the Spanish Conspiracy, American Historical Review, pp. 502-503.) Wilkinson evidently intended to carry on a traffic in slaves but there appears to be no record of his exporting negroes from Kentucky.

[A]The agreement with his New Orleans partners was that tobacco, flour, butter, tallow, hogs, lard, beef, pork, bacon, and hams were to be sent to them in good order—dangers of river excepted—and were to be converted into cash with which should be purchased and sent to the Falls of the Ohio, European and West Indian commodities deemed by all the partners necessary for the use of settlements on the Ohio. (Clark, Note 3, p. 18.)

In 1788 Wilkinson's agents in New Orleans sent to Kentucky a boat loaded with merchandise valued at $8,000, which owing to the "dilatory conduct" of the patroon and crew was frozen up in the Ohio during the winter. Only a part of the cargo reached its destination and the Spanish government reimbursed Wilkinson for the damages sustained ($6,121). Wilkinson says that this barge (the Speedwell) was the "first boat of trade" from New Orleans to Kentucky (an inexact statement, see Note A, p. 54), and that the adventure was made at the particular instance of the Spanish governor to ascertain the practicability of a commercial intercourse between the two places. (Wilkinson's Memoirs, Vol. II, p. 237; Clark, p. 35.) The governor wrote to Wilkinson not to sell his goods for more than they cost him in New Orleans because it was highly important that this "first essay" should inspire the inhabitants of Kentucky with the most flattering hopes. His letter reads: "I have good reason to expect that the arrival of the boats will produce the most agreeable sensation among those people and make them feel more keenly that their felicity depends on the concession of such commercial facilities by his majesty and for the acquisition of which I conceive there are but few sacrifices which they would not make." (Charles Gayarre, History of Louisiana, Vol. III, p. 220. 1903.)

Kentucky, where he arrived in February, 1788, ten months after his departure.[10] According to Marshall, the historian,[11] attended by slaves he returned in a chariot drawn by four horses and was received by his friends as an ambassador who had gained greater concessions from Spain than the Federal Government had been able to secure. He began immediately to prepare another expedition. In the words of Daniel Clark, the nephew of his partner in New Orleans, he "bought up all the produce he could collect which he shipped and disposed of as before mentioned; and for some time all the trade from the Ohio was carried on in his name, a line from him sufficing to insure to the owner of the boat every privilege and protection he could desire."

The produce for the second venture,[A] obtained at various points within the State, was brought to Louisville for shipment. A description of the fleet in readiness to start on the expedition is preserved in the New York Journal and Weekly Register of March 5, 1789.

[A]Wilkinson made shipments during 1788, but he did not accompany the cargoes which were sold by agents for more than $10,185. (Clark, Note 27, pp. 55-56; Wilkinson's Memoirs, Appendix, Deposition XIII.) During that year tobacco brought ten dollars per hundredweight, and pork ten dollars a barrel. (*Ibid.*)

Agents were also employed to collect the produce for shipment. The Kentucky Gazette, December 15, 1787, contains the following advertisement:

"The subscribers are authorized by General Wilkinson, to purchase tobacco, tallow, butter, well cured bacon, hams, lard, and smoked briskets of beef, to be delivered on the Kentucke at the mouth of Hickman, the mouth of Dick's River and General Scott's on or before the (20) twentieth of January next. The butter and lard to be in kegs not to exceed forty-five pounds net. These articles being intended for a foreign market it is necessary that they be handled in the manner not only to do the seller credit but to recommend our commodities to foreign merchants and make them desirous of engaging in a commercial intercourse with the Western Country. We, therefore, propose to have the tobacco inspected by the gentlemen hereinafter named at the following places: at Hickman, Mr. William Lewis, of Fayette and Mr. Richards Barbour of Mercer; at Dick's River, by Mr. John Curd, senr., and Capt. Robert Mosby, of Mercer; at General Scott's by the General and Capt. John Watkins of Fayette; those who have any of the above articles to dispose of may know the terms by applying to Harry Innes; Horatio Turpin.
Dec. 12, 1787."

EXTRACT OF A LETTER FROM LOUISVILLE (FALLS OF OHIO) TO THE EDITOR HEREOF, DATED JAN. 16, 1789

"Our friend General W—k—f—n has fitted out a small fleet, for a second expedition to New Orleans; it consists of 25 large boats, some of which carry three pounders, and all of them swivels, manned by 150 hands, brave and well armed, to fight their way down the Ohio and Mississippi into the gulph of Mexico.

"This is the first Armada that ever floated on the Western waters, and, I assure you, the sight of this little squadron, under the Kentucke colours opens a field of contemplation, what this country may expect from commerce at a future day.

"The cargoes consist chiefly of tobacco, flour, and provision of all kinds, some of which has been packed up in ware houses this three or four years past; and where it certainly would have remained, had not the General, through his indefatigable enterprise and genius, opened the too long barricaded gates.

"He has been very unjustly censured, by the inconsiderate part of mankind, for having monopolised the Spanish trade, but the more expanded mind acknowledges, that to his penetrating genius, Kentucke stands indebted for having procured its citizens a market, from which the jealousy of our neighbors excluded us this many years past.

"Mr. B——n, our late negociator, and a Spanish gentleman, son-in-law to the Governor of Louisiana, are to accompany the General on this commercial (or as some will have it political) expedition. Our politicians seem silently contemplating on the conduct of the Atlantic States, and wait to hear the fate of Kentucke pronounced by your new Congress."

Wilkinson's treaty did not give him a monoply of the southern trade for Spain in 1788 adopted a conciliatory attitude towards the western settlers in general, hoping to detach them from the control of their government.[22] Immigration into her provinces was encouraged, and the exactions of the navigation laws were often relaxed.[A] That the privileges granted to Wilkinson

[A]The navigation laws were often evaded by subterfuge. Daniel Clark, under date of April 18, 1798, writes to Secretary of State Pickering:

"On granting this privilege to Wilkinson the government (Spain) came to a resolution of encouraging emigration from the western country; and offered passports to all settlers with an exemption of duty on all the property they might bring with them invested in the produce of the country they came from. Under the denomination of settlers all those who had acquaintance with a few persons

were of advantage to shippers, however, is attested by an account published in the American Museum[11] of the scant courtesy accorded a trader from Tennessee.

GEORGETOWN, APRIL 16

A letter from New Orleans, dated Feb. 16, 1789, says: "An unfortunate event has lately taken place in this part of the world, which probably may break the late established harmony between the Spaniards and our states. You have, no doubt, been informed of the port of New Orleans being opened to our countrymen settled on the western waters; in consequence of which, the Mississippi has been covered with fleets of boats from Cumberland, Kentucke, &c. floating down great quantities of provision, flour, plank, &c. which, on account of the distressed situation the inhabitants were reduced to, by the late fire, have been disposed of to great advantage.

"The last transport (as we are informed here) arrived from Cumberland settlements, at the Natches,* about six weeks ago, owned by colonel Armstrong, consisting of six large boats, manned by thirty hands. The garrison, standing in need of provisions, though not willing to pay the price which was demanded, the commandant refused to grant them the necessary passport† to proceed to New Orleans; our people, however, disposed of their cargoes to some Americans settled at the Natches,

of influence in Orleans obtained passports; and made shipments to their address, which were admitted free of duty; and under pretense of following shortly after with their families continued their speculations; others came with property, had lands granted, which, after locating they disposed of, and having finished their business they returned to the United States; a few only remained in the province and they were the people who in general availed themselves least of the immunities granted by government; This encouragement given to emigrants and speculators opened a market for the produce of the Ohio. Flour was imported from Pittsburg and the farmers finding a vent for all they could raise, their lands augmented in value, their industry increased, and they have exported annually to Louisiana for some time past from ten to eighteen thousand barrels of flour for which they generally find a ready market."

The duty on importations from the Ohio to New Orleans was reduced from twenty-five to fifteen and later to six per cent. and the valuation rates were low. Flour was valued at four dollars a barrel and tobacco at three dollars a hundredweight. (Clark to Pickering, Annals of Congress, 10th Congress, First Session, Appendix, pp. 2734-2735; Wilkinson's Memoirs, Vol. II, Appendix, Deposition XIII; Wilkins to Innes, see Appendix, p. 224.)

Wilkinson, taking advantage of the privileges accorded immigrants, sent tobacco by them to New Orleans, and insured their future co-operation by forming business partnerships with them. (Wilkinson to McIlvain, Appendix, p. 226.)

and were on their return home, when the commandant of the fort sent an officer with fifty Spanish soldiers after them, to arrest colonel Armstrong, and bring him to the fort: the colonel refused to obey the order of the Spanish commandant: told the officer, that, as an American, and within the lines of the territory of the United States, he was subject to no controul of any power on the face of the earth, except that of the laws of his country; he begged the officer to desist from any act of violence, as such would be accompanied with the most serious and fatal consequences.

"The officer still persisting to execute his orders, and one of the Spanish soldiers imprudently presenting his musket at the colonel's breast, the Americans took to their rifles, the Spaniards firing first. An engagement followed; and the twenty-four Cumberlanders made the Spaniards take to their heels, leaving five killed and twelve wounded on the field of battle; the officer being amongst the dead.

"This affair has made a great noise in this place, and exposes those few of our countrymen now residing here, to the malice of the Spaniards; they have given our countrymen the name of Blanco Savago,‡ owing to some of colonel Armstrong's men handling the tomahawk pretty freely in the late engagement."

*A fort still in possession of the Spaniards on the Mississippi, within the limits of Georgia.

†No American boat is permitted to go to New Orleans without entering at the fort and producing a passport.

‡White savage.

Yearly shipments were made by Wilkinson until 1791 when he abandoned commercial life to re-enter the army.[34] By that time his sales in New Orleans had probably amounted to $100,000[35] and more.[A] The greater part of the produce was shipped down the Kentucky[B] in what were nominally his flat-

[A]The tobacco was purchased by the Spanish Government and stored in the royal magazine from which it was shipped to factories in Spain. When the boats were delayed past sailing dates, the cargoes were stored at Wilkinson's risk until they were shipped abroad. (Wilkinson's Memoirs, Vol. II, Appendix, Deposition XIII.)

[B]Shipments were probably made from points as high as Boonesborough. Jefferson, in 1780-1781, describes the river as ninety yards wide at mouth, and also at Boonesborough, and states that it afforded navigation for loaded batteaux 180 miles in direct line during winter tides. (Thomas Jefferson, Notes on the State of Virginia, p. 7, 1894 Edition.)

Some of the boats were constructed for Wilkinson under contract, of which the following is an example:

boats or in those of customers who joined his fleet. Delays and losses began before the Ohio was reached. In a letter to his partners in New Orleans, dated May 20, 1790, Wilkinson[16] writes:

"I am sorry to inform you that one of our flats after being loaded with forty hogsheads, sprung a leak and in spite of our endeavors, sunk. The tobacco is wet, but I believe we shall be able to save the greatest part of it, though it will involve the inevitable detention of this tobacco until my next shipment."

Another communication under date of June 20, 1790, reads[17] in part:

"Your surprise at hearing from me at this late date cannot exceed the mortification and regret I feel from the delay. My boats unfortunately grounded in Kentucky River and were left by the flood. Mr. Nolan will give you the details and will explain to you the personal hardships and risques I have been exposed to for three weeks past.....three of the fleet which sailed are still aground in Kentucky River with one hundred and eighteen hogsheads on board. The tobacco Mr. Nolan now

"Know all men by these presents, that we, William Pope, and Hugh Ross, are held and firmly bound unto James Wilkinson in the sum of one hundred pounds to be paid to the said James Wilkinson, his heirs or assigns, to which payment will and truly be made, we bind ourselves, our heirs, executors, and administrators firmly by these presents. Witness our hands and seals this 19th day of December, 1787.

"Whereas, the said William Pope hath undertaken to build boats for the said James Wilkinson at some Landing on the Kentucky River at, opposite to or above the mouth of Jack's Creek, agreeable to the following bill, viz: The sills, commonly called the Gunnels to be fifty feet long, six inches on the tread and as wide as the timber will admit of, the boat to be thirteen feet in the clear, two sleepers fifty feet long and six inches square, the bottom planks two inches thick, twelve boards to be put on across the boat, the side plank to be one and one-half inches thick. The stanchions or studs to be three inches by six—five feet high and five of a side. The boats to be finished in a workmanlike manner, to be pinned with seasoned white oak pins and bored with one inch augur, and sides to be five feet high and the whole to be of oak timber. The conditions of the above obligation is such that the said William Pope shall make the said boats on or before the 25th day of January and have them launched. The said Wilkinson finding tar for the pitching of the boats, and the said Pope to put rafters for roofing, and shall deliver them to the said Wilkinson, or his agent, after they are launched, then the above obligation to be void—but it is to be understood that in case the severity of the season should render the execution of the work impracticable, no advantage to be taken of the said Pope by the said Wilkinson."

WILLIAM POPE [Seal]
HUGH ROSS [Seal]

(From the Innes Papers, quoted by George D. Todd in "How the Pioneers of the West Marketed Their Products and the Difficulties They Had to Contend With," unpublished manuscript, Filson Club Papers. 1903.)

takes down can be appropriated on the same equitable principles and the same just scale of proportion set forth in my letter of the 20th of May. The drowned tobacco is by this time completely recovered. I expect at a loss of twelve or fifteen thousand pounds. I shall ship it and it will go down with the three boats which are aground as soon as the flood offers which I expect must take place in the course of the month.

"The stoppage of the boats has been attended with some additional expense which was unavoidable in the measures necessary to get them out of the Kentucky River and secure the tobacco."

Tobacco was the chief commodity shipped,[A] and for marketing this the enterprising merchant exacted a commission of two thirds of the proceeds above fifteen shillings a hundredweight and a freight charge of four shillings a hundredweight from Louisville, or six shillings from Frankfort. The details of the transactions are given in the following letter from Wilkinson and his partner in Lexington to Colonel Isaac Shelby, in Lincoln County, afterwards governor of the State, and in an enclosed circular subscription list, which was printed and distributed among the planters of the District of Kentucky:

Dear Sir, Lexington, Decr 19th '89.

We enclose you certain propositions to the planters of this District, to which we beg your patronage;- this plan we humbly conceive is founded on principles of sound policy, as it tends to support the price and encourage the culture of the article it has in view, and we are persuaded it embraces the interest of individuals more immediately than any prospect, which does or can offer under the existing circumstances of our commerce.

1000 Hhds: of Tobo in the hands of one man, will stand a much better chance for a market than the same quantity in 20 hands at any market, and we know that the privileges & connexions of our J. Wilkinson will give us a decided advantage over any man, who will present himself at that city. We do not look for any extraordinary advantage from the present scheme but we

[A] In one of Wilkinson's ventures in 1791, the three boats were the Royal Oak, Dreadnaught, and Union, and when finished and loaded ready to descend the Kentucky River the boats contained respectively, forty-one hogsheads, weighing 42,911 pounds net; thirty-nine hogsheads, weighing 38,890 pounds net; forty hogsheads weighing 40,241 pounds net. (*Ibid.*)

flatter ourselves we shall be able to make some small compensation for our trouble & that the satisfactory return we shall make to the shippers, will secure the future confidence & custom of the planters. We expect that we shall be able to close this transaction & render the returns by the first day of Nov. next.

We shall esteem it a particular favor if you will give such support & render such service to the enclosed proposition & subscription list as you may conceive compatible with your interest & that of your fellow citizens.

Your name at the head of the list affsd wd not only tend greatly to promote the execution of the proposed scheme, but would be a mark of confidence very flattering to, Dear Sir,

Your most obt Servants
(Signed) James Wilkinson.
(Signed) Peyton Short.

TO THE PLANTERS OF THE DISTRICT OF KENTUCKY

Gentlemen.

The subscribers beg leave to propose the following plan for your consideration, and they flatter themselves, the liberal foundation on which it rests will procure your patronage to the scheme.

We will receive Tobacco on consignment for the city of New Orleans, at 15s. per hundred, to be shipped under the sanction of J. Wilkinson's privileges and engagements, but at the risque of the shippers, the whole cargo to go under the immediate direction of P. Short, whose duty it shall be to dispose of the same to the best possible advantage either in New Orleans, or by shipping it to Europe. We are willing either to advance for all the expenses which may arise on the shipment and transport of this Tobacco to market, or that these expenses should be disbursed by the consignors at their option, calculating every 100 lb. of Tobacco shipped from Kentucky river at 6s, and from Louisville at 4s6. to the city of New Orleans. From the proceeds of the sales the charges shall be first refunded and then the planter shall be paid the 15s per hundred, should so much arise on the sales, after which any surplus remaining shall be divided in the proportion of two thirds to the subscribers and one third to the consigner. Fair regular and distinct accounts shall be kept and rendered to each person of the sales of his Tobacco, and satisfactory security given for the faithful discharge of the trust reposed in us by the consignors.

We submit these propositions to your consideration and are persuaded no illiberal construction can be placed upon our views, which are inseparable from your interests; for it is evident if you do not profit, we shall suffer a loss of our time and trouble. Should this plan succeed we will take arrangements to make a small advance in cash or merchandize to the shippers, in proportion to their consignments, but before any final step can be taken, it is necessary we should ascertain whether a sufficiency of Tobacco can be obtained to render it an object worthy of our attention, and it is for this purpose we have lodged this address and the adjoining subscription in the hands of gentlemen in every quarter of the District; we have therefore only to add our wishes that all those who incline to adventure their Tobacco with us, would embrace the earliest opportunity to subscribe the quantity they propose to furnish. The preparation and providing of boats, hands and provisions, will require at least two months, and the expedition if it goes at all, should pass the rapids of Ohio, before the first of May.

James Wilkinson.
Peyton Short.

We the subscribers, promise, bind and oblige ourselves our heirs &c. to consign to James Wilkinson and Peyton Short, on the preceeding terms and conditions, the quantity of Tobacco to our names severally annexed, and we engage to have the said Tobacco ready at the time and place now specified, under the penalty of any damage or loss the said Wilkinson and Short may sustain by our failure. Witness our hands and seals.

Date	Subscribers Names	Quantity of Tobacco	Where to be Delivered	When to be Delivered

The center of Wilkinson's operations was Lexington, Fayette County, where in 1784 he had opened a store.[A] He was probably connected with a mercantile firm in Philadelphia and with the assistance of agents in New Orleans, his business was conducted by methods far in advance of those customary in the western country at that day. His contribution to commerce

[A]This was the third store opened in the colony. (Collins, History of Kentucky, p. 259; Verhoeff, The Kentucky Mountains, p. 75, Note A.) The Kentucky Gazette, September 6, 1788, records the arrival in Lexington of Wilkinson's cargo of tobacco and a large assortment of clothes, powder, lead, woolens, linens, writing paper, and books.

consisted not only in organizing a shipping industry and opening a market but also in securing specie payments. This was of great advantage to a pioneer community where trade was carried on chiefly by barter. The exact amount of coin paid for the cargoes[A] is unknown but four "mule loads" of money besides other large sums were sent to Kentucky. Previously, land warrants and the skins of wild animals[B] had been chiefly used in lieu of money. Thereafter—until banks were established in the State two decades later[C]—the Spanish dollar or piaster, and next

[A]The exportation of specie from Spanish territory to the United States was forbidden although occasionally influential individuals were granted this privilege. Traders in general were obliged to pay the same tax—six per cent.—as that exacted for other exports. (Letter from Charles Wilkins to Judge Innes, Appendix, p. 224.) Wilkinson found great difficulty in procuring reliable agents to convey the money home. Much of it was sent by sea, a safer route. Some of the payments from the government were not made until 1803. This embarrassed him with his creditors and to his enemies was proof of his political corruption, but his friends contended that the Spanish delayed payment to keep him in their power. In 1794, $6,000 was lost by his agent Owens who was sent to the mouth of the Ohio in a public galley. He there embarked in a perogue with the money loaded in barrels. A few days later he was murdered and robbed by the crew of six Spanish sailors furnished by the Spanish authorities. (Clark, p. 16.)

[B]The skin of the beaver was the unit and measure of value because of the superior quality of the fur and the readiness with which it could be sold in foreign markets. "One beaver skin was reckoned as equaling so many deer, fox, raccoon or muskrat skins in value. Merchants kept their accounts with hunters in beaver skins and receipts for such peltries passed from hand to hand." (Basil W. Duke, The History of the Bank of Kentucky, p. 9.)

A crude system of banking based on furs and skins was inaugurated at Louisville in the spring of 1780 by John Sanders, a famous old hunter. A flatboat roofed over served as a warehouse or "keep," where skins were received from the hunters and certificates of deposit were issued which were assignable and payable to bearer. The following certificate was found among the papers of Daniel Brodhead, a merchant who opened a store in Louisville in 1783:

"Know all men by these presents, that Daniel Boone hath deposited 6 beaver skins in my keep in good order and of the worth of six shillings each skin, and I have took from them 6 shillings for the keep of them, and when they be sold I will pay the balance of 30 shillings for the whole lot to any person who presents this certificate and delivers it up to me at my keep. Louisville, Falls of Ohio, May 20, 1784. JOHN SANDERS."

(Durrett Manuscripts, University of Chicago.)

[C]This was a period of monetary confusion in Kentucky. Until after the separation from Virginia the English system of pounds, shillings, and pence was the money of account, and besides the Spanish coins various other foreign moneys were in circulation. "Virginia issued during the Revolutionary struggle nearly one hundred millions of paper money and no inconsiderable amount of it found its way into Kentucky. This issue of course became enormously depreciated in value and in 1781, just before Virginia declared it no longer a legal tender, it was rated at one thousand for one Spanish dollar. Paper money issued by the other colonies and a portion of the $300,000,000 issued at various dates by the Continental Congress also reached Kentucky and all of this likewise became immensely depreciated. It is not surprising, therefore, that paper money and banks with

to this warehouse receipts, especially for tobacco, were the most popular and reliable media of exchange. After 1791 it is true the notes of the bank of the United States appeared but they were only occasionally used and were considered aristocrats among the "peasant bills" which were handled with care and admired for the fine pictures upon them.[40]

Trade agreements between Spanish officials and private citizens were not unusual[41] but the sums received by Wilkinson from his transactions were claimed by his enemies to exceed payments due him. He was accused of political intrigues with Spain against the United States Government and although acquitted when tried by court martial, evidence from Spanish archives published at a later date have proved him guilty.[42] Whether or not a traitor to his country, he did much to promote long distance traffic on the Kentucky and was a notable pioneer in the development of western commerce. He writes in his own defense:[43] "These voyages (to New Orleans) cost me upwards of a thousand guineas and the community of which I was a member profited by my toils, perils, and expenses."

From these beginnings a system of exchange through a vast territory developed on the Kentucky and other rivers in the State. In New Orleans, the traders, unable to return the square-end flats against adverse currents, sold the fleet for its wood and disbanded the crew. Many returned afoot through the "Indian Country" of Mississippi and Tennessee with Spanish silver in leather pouches slung over their shoulders. In some cases the proceeds of the sales were invested in the light weight luxuries found in New Orleans which were boated upstream[A] in keel or

which its issue was associated were neither popular with the first settlers of this State." (Basil W. Duke, History of the Bank of Kentucky, p. 7. Louisville, 1895.)

[A] In a short time heavier commodities were added to the cargoes. Millstones of great weight were sent from France to New Orleans and transported in keels to Kentucky. Quantities of lead were brought from the mines near St. Genevieve,

barge.[A] The more ambitious traders went on by sea[B] to markets on the Atlantic coast where they purchased merchandise, sent it over the Wilderness Road or brought it to Pittsburg or Wheeling by packhorse or wagon and shipped it down the Ohio to Kentucky storekeepers.[C] Commerce for many years moved around the mountain barrier in the circuitous land and water route thus established.

Missouri, as those worked in Kentucky were unsuccessful. (Michaux's Travels, Thwaites, Vol. III, p. 203; Cuming's Tour, Thwaites, Vol. IV, p. 179.)

[A]Audubon, the naturalist, described the boats used for ascending the river from New Orleans:

"A keelboat was generally manned by ten hands, principally Canadian-French and a patroon or master. These boats seldom carried more than from twenty to thirty tons. The barges had frequently forty or fifty men with a patroon and carried fifty or sixty tons. Both of these kinds of vessels were provided with a mast, a square sail, and coils of cordage known by the name of cordelles. Each boat or barge carried its own provisions.....I could tell you of the crew abandoning the boat and cargo, and of numberless accidents and perils, but be it enough to say that advancing in this tardy manner the boat that left New Orleans on the first of March did not reach the Falls of the Ohio until the month of July, nay, sometimes not until October, and after all this immense trouble it brought only a few bags of coffee and at most one hundred hogsheads of sugar. .....The number of barges at that period (1808) did not amount to more than twenty-five or thirty and the largest probably did not exceed one hundred tons burden.....a barge which came up in three months had done wonders for I believe that few voyages were performed in that time." (M. R. Audubon, Audubon and His Journals, Vol. II, pp. 452-453. New York, 1900.)

[B]The many hardships and trials which beset these traders is indicated in the experiences of Mr. Andrew Baynard, of Philadelphia, who brought hardware to Kentucky on packhorses by way of the Wilderness Road and bartered it for tobacco which he shipped to New Orleans. He left the mouth of Dick's River the last of May, 1790, on his way down the Kentucky. When passing the mouth of Drennon's Creek his boats were attacked by Indians, but there were no damages beyond a few slight wounds to the boatmen. He reached New Orleans the last day of June. His trip from Louisville to Philadelphia is described in a letter to Judge Innes at Danville. (See Appendix, p. 229.)

[C]Freight was brought down the Ohio in the Kentucky broad-horns or arks which were built of various sizes with a rectangular frame, square at both ends, and with broad thick gunwales for protection at first from Indians and later from robbers. A part of the boat was generally partitioned off and covered with a low flat roof for the use of passengers and their effects. The boats were from twenty to fifty-five feet in length and from ten to fourteen in breadth, with the "arched roof or deck supported by strong sides six or seven feet in heighth, and cost from one dollar to a dollar and a half a foot in length." There were one or more pairs of large oars on each side and an oar or sweep at the stern for steering. Such craft drew three feet of water and made the trip from Pittsburg to Louisville in ten days. (Saint John De Crevecoeur, Sketch of the river Ohio and of the Territory of Kentucky, August 26, 1784, Louisville Monthly Magazine, Vol. I, p. 35. 1879. D. B. Warden, Statistical, Political and Historical Account of the United States of North America, Vol. II. 1819. Johnston's Memorial History of Louisville, Vol. I, p. 309.)

The obstructions in the Mississippi and Ohio Rivers were similar to those of the Kentucky so that navigation was limited to seasons of high water which usually occurred throughout the basins during spring and winter. The great obstacle in the path of the southern trade was the Falls of the Ohio,[A] sixty miles below the mouth of the Kentucky. Here a series of rapids extending for two miles and a half down stream was a source of delay and often of disaster to pioneer craft.[B] Louisville at the head of the obstruction, and Shippingport, at the foot became important shipping points as portage was necessary sometimes for three-fourths of the year.[44] Filson, referring to the Ohio in 1784, writes:[44] "When the stream is low empty boats only can pass and repass this rapid, their lading must be transported by land but when high boats of any burthen may pass in safety. Excepting this place there is not a finer river in the world for the navigation of boats."

To gain a revenue from the foreign trade, the Virginia Assembly by act[44] of May 8, 1784, provided for the collection of

[A]See p. 71; Baynard to Innes, Appendix, p. 229.

[B]See p. 121, Note B. The chutes were very crooked with swift currents and whirls, and dangerous rocky points projected from the sides and bottom. At present, although the main channel has been improved, skilled pilots with a knowledge of local conditions are necessary. Pilots are referred to by Captain Thomas Hutchins (Topographical Description of Virginia, London, 1778, etc.) who visited the Falls in 1766 before Kentucky was settled. He writes: "The Rapids in a dry season are difficult to descend with loaded boats or barges without a good pilot; it would be advisable therefore for the bargemen, in such season, rather than run any risk in passing them to unload part of their cargoes and reship it when the barges have got through the rapids. It may, however, be proper to observe that loaded boats in freshes have been easily rowed against the stream (up the rapids) and that others by means only of a long sail have ascended them."

The business of convoying boats across the obstruction was of a private nature, until an act of the Kentucky legislature, February 21, 1797, provided that pilots should be appointed by the Court of Jefferson County, who were to receive two dollars for each boat piloted through. Any person conducting boats except those licensed under the act were required to pay a penalty of ten dollars for each offense. The preamble to the act reads: "And whereas great inconveniences have been experienced and many boats have been lost in attempting to pass the Rapids of the Ohio for want of a pilot and from persons offering their services to strangers to act as pilots by no means qualified for this business," etc. (Littell, Vol. I, p. 605.)

customs at Louisville and also at Limestone[A] (Maysville), another important shipping point on the Ohio. Naval officers, as the collectors were called, were appointed for these posts and given the same powers as other naval officers in the commonwealth. Specific rates were charged for distilled spirits, sugar, and coffee, and all other importations were taxed ad valorem.[47] An act of December 30, 1788, provided that as soon as the Federal Government had arranged for the collection of customs the State laws relating thereto would be automatically repealed.[48]

In 1789 when the first custom districts were established by Congress, Louisville was made a port of entry for the district of Kentucky and on August fourth of that year Peyton Short, the business partner of Wilkinson, was appointed collector.[49] For ten years this was the only port on the western rivers.[B]

[A]Maysville, at the mouth of Limestone Creek, Mason County, was in 1787 established as the town of Limestone by an act of the Virginia Assembly. There is here one of the best harbors in Kentucky. It was described by the pioneers as without current (Collins Vol. II, p. 558) and from the beginning was a popular landing place for immigrants. It is 193 miles above Louisville and sixty-five miles by road from Lexington. It is described by a traveler in 1807:

"Maysville is the greatest shipping port on the Ohio below Pittsburg, but it is merely such, not being a place of much business itself, but only serving as the principal port for the northeastern part of the State of Kentucky, as Louisville does for the southwestern. It has not increased any for several years and contains only about sixty houses. It is closely hemmed in by the river hills over which the most direct road from Philadelphia through Pittsburg and Chillicothe leads to Lexington, and thence through the State of Tennessee to New Orleans." (Cuming's Tours, Thwaites, Vol. IV, p. 169.)

The Kentucky legislature, February 13, 1828, requested Congress to improve the road referred to as a part of the national road from Zanesville, Ohio, to New Orleans. A bill for the improvement was passed but it was vetoed by President Jackson May 27, 1830. The section between Lexington and Maysville had already been improved by the State (Collins, Vol. I, p. 539) and it was one of the first of the macadam highways built between 1830 and 1840. (See p. 108, Note B.)

[B]In 1799, besides Louisville, a number of towns were made ports of entry, to take care of the trade of the Ohio and Tennessee Rivers; "Columbia (later Cincinnati) served the entire upper Ohio, and Palmyra the Cumberland River; but only two years later the port of Palmyra was abolished and Fort Massac on the Ohio was made to serve the Tennessee country.....In 1802 the upper Ohio Valley was divided, Marietta being made a port to serve the Pittsburg-Portsmouth section of the valley." (Archer P. Hulbert, Western Ship-Building, American Historical Review, July, 1916, p. 721.) In 1807 all of the western districts were amalgamated into the Mississippi district with a general custom-house at New Orleans. The Louisville collectorship was abolished and the office of inspector or surveyor established in its stead. The duties of the new officers

Wilkinson's successful expeditions gave an impulse to the cultivation of tobacco in Kentucky, and the number of public warehouses for its storage and inspection increased rapidly along the rivers. Some of them antedated his first trips to New Orleans[A] and greatly facilitated trade with the south. These crude magazines were operated and most of them were erected under special laws enacted by the Virginia Assembly. The tobacco was inspected by county officials appointed for the purpose, who issued warehouse receipts which were legal tender[50] for taxes and other public debts.[B]

An act[51] of October, 1783, entitled "An Act for establishing inspections of tobacco on the western waters" was intended[C] to provide "some temporary method" for the "reception and inspection of tobacco at or near the heads of rivers and creeks."

were to survey all boats constructed in the district and to grant temporary licenses which were to be surrendered upon the arrival of the boat in New Orleans. (U. S. Statutes at Large.)

[A]See p. 57, Note A.

[B]A general act for the establishment of public warehouses, under date of October, 1776, provided that if the inspectors upon breaking open a hogshead should agree that the same was merchantable they should weigh such tobacco and the cask, entering in their books and stamping on the cask the mark, number of gross tare, and new weight thereof, and give to the owner a note or receipt for same. The notes of the warehouse should pass in payment of levies, officers' fees, and other tobacco debts payable in the counties. Forgers and counterfeiters of tobacco notes were liable to "suffer death without benefit of clergy." (Hening, Vol. IX, p. 153.) By act of October 22, 1786 (*Ibid*, Vol. XII, p. 258), the notes could be used for the payment of taxes, rated at 20 shillings for one hundred pounds, and were to be paid to the Superior Court and applied to the expenses of local government, the surplus to be paid into the State Treasury.

In special acts for the Kentucky establishments the inspectors were directed to charge for storage and inspection ten shillings for each hogshead and one shilling and three pence per hundredweight for tobacco in lesser packages. The inspectors' salaries and the support of the warehouses were to be derived from such funds. The salaries were fixed at twenty-five or thirty pounds, and after 1783 all of the acts stated that if the tobacco inspected was not of sufficient quantity to pay the "usual charges and inspectors' salaries," the deficiency would not be paid by the public. (Hening, Acts of 1783, 1785, 1787, etc.)

[C]The chief object in the establishment of warehouses in Kentucky was to provide the inhabitants with a means of paying their taxes (Hening, Vol. XII, p. 258) which until the opening of the New Orleans market was impractical on account of the lack of transportation facilities. Until 1776 tobacco exported by the colonies was required by law to be taken directly to England in English ships and by English merchants. From there it was exported to the continent. As a

Warehouses were authorized to be opened at the Falls of the Ohio on the lands of John Campbell, Jefferson County; and on the Kentucky, at Leestown on the land of Hancock Lee, Fayette County; and at the mouth of Hickman Creek on land of James Hogan, Lincoln County.

The warehouse on the Ohio[52] was built below the Falls on the site of Shippingport. The boats were often wrecked when passing the rapids and the tobacco taken to this establishment, which for a time was the only one on the Ohio in the Kentucky District.[A]

On the Kentucky it was several years before the act was put into effect.[B] At Leestown the warehouse was not erected but under the terms of the act Wilkinson, who came to Kentucky in 1784, built one at Frankfort on his own land.[53] Later doubts arose as to whether the notes issued there for tobacco inspected in large quantities was legal tender. The dispute led to the legalization[54] of the inspection in 1791. At Hickman Creek the warehouse was probably not built[55] until 1787, but in the

result of the war, shipments prohibited by State laws to England and her colonies (Hening, Vol. IX, p. 162), were made directly to the continent, and Glasgow, which had been the leading tobacco center of the world, was ruined. During the war Spain imported large quantities of tobacco from the West Indies and at its close became one of the leading markets in Europe. (Meyer Jacobstein, The Tobacco Industry in the United States, Columbia University Press, 1907.)

[A]This warehouse was not prosperous and unable to support itself practically went into bankruptcy in 1791 when State aid was refused for inspection. (Robertson, pp. 175-176.) Business was continued, however, until after Kentucky became a State, when in 1795, the establishment was suppressed by legislative enactment and another was authorized to be opened in Louisville near the mouth of Beargrass Creek. (Littell, Vol. I, p. 326.)

[B]Filson in 1784 mentions eight towns in Kentucky as "laid off and building," Louisville, Harrodsburg, Danville, Boonesborough, Lexington, Leestown, and Greenville. With the exception of the first two, all of the towns were located in the Kentucky basin. (See p. 76.) Filson writes: "The last two being on Kentucky River, at these and many other places on this and other rivers inspecting houses are established for tobacco which may be cultivated to great advantage although not altogether the staple commodity of the Country." (Filson's Kentucky, Imlay, p. 280.) There may have been private establishments on the river at this time, otherwise this statement in regard to warehouses appears to be incorrect.

preceding year another was authorized to be located at the mouth of Dix River on the land of John Curd, Mercer County.[59]

Between the years 1787 and 1790, inclusive, establishments were authorized[A] to be built and were opened for business at the following places on the Kentucky: Mouth of Hickman Creek, Fayette County (Hogan's); Harrod's Landing on the land of Walter Beall (Harrod's); Mouth of Craig's Creek on land of General Charles Scott, Fayette County (Scott's);[B] Boonesborough, Madison County (Boone's); land of John Collier, Madison County[61] (Collier's); mouth of Stone Lick at Steel's Landing, Fayette County;[58] Jack's Creek, Madison County.[59]

Requests for warehouses[C] were often refused by the legislature although it was represented[60] that those existing were difficult of access to many inhabitants because of bad roads, the precipitous cliffs, the risk and inconvenience of fording the stream and the expense of "ferriage." In 1789 a body of citizens sent a remonstrance asking that the number in a county be limited to two and that the sites be selected by the county courts. It was claimed[61] that numerous petitions for additional ones on the Kentucky were based on "neither justice or good policy" as the population was unable to provide the necessary weights and scales or houses for the desired establishments, a

[A]The majority of the warehouses were established by an act of October, 1787, entitled "An Act for establishing several new inspections of tobacco and reviving and establishing others." (Hening, Vol. XII, p. 580. See also Robertson, pp. 98, 102, 105, 113, 128, 132, 139.) Other establishments were authorized to be built on the Licking and Salt Rivers and at Limestone on the Ohio. (Hening, Vol. XII, p. 580.)

[B]In the vicinity of some of the warehouses, mercantile stores were opened. The Kentucky Gazette of January 24, 1789, contains the following advertisement: "Just opened and for sale by John Rhea at his store at Scott's Warehouse on the Kentucky, a very general assortment of Dry Goods, Hardware, and Groceries for which Cash, Tobacco, Ginseng, Furs, viz: Beaver, Raccoon, Foxes, Wildcats, and other skins will be taken in payment."

[C]The places designated as favorable sites were: The land of Eli Cleveland, Fayette County (Robertson, p. 132); land of William Bush opposite Boonesborough (*Ibid*, p. 139); land of John Holder on the west side of Howard's Creek, Clark County (*Ibid*, p. 139); land of Michel Bedinger, three-fourths of a mile below Tate's Creek, Madison County (*Ibid*, p. 128).

greater number of which would "divide the attention of the people so that they must fail."

The warehouses established at this time are of especial interest in that they mark the introduction into Kentucky of a system of State inspection of commodities intended for foreign markets which was continued for several decades after the separation from Virginia and was of great importance to river commerce. In the case of tobacco the warehouse method of marketing is still in vogue, and until the day of trusts conferred upon the planters the advantages that accrue to sellers from open competition with buyers. It is at present a characteristic feature of the southern tobacco districts. Here each section has its public warehouse situated in the nearest town or city where the methods are practically the same as those employed in the old Virginia establishments save that the inspectors are chosen and paid by associations of warehousemen.[62]

The Kentucky legislature adopted the Virginia system by an act[63] of December 13, 1792. For each "inspection" of tobacco,[A] hemp, or flour, which included one or more warehouses within a county, three inspectors were to be appointed by the governor. Notes, assignable and negotiable, could be issued, which were used for the discharge of public and private debts,

[A]For tobacco, the shipper paid nine shillings, six pence for inspection and storage, and three shillings for prizing and nails, as well as a charge for the cask and an export tax. (Littell, Vol. II, pp. 150-151.)

Tobacco shipped from the State was required to be packed in hogsheads or casks containing a minimum of 1,000 pounds net. (*Ibid*, Vol. II, p. 152.) December 13, 1798, the dimensions of hogsheads were fixed at a maximum of 52-inch stave length, and a 34-inch heading. (*Ibid*, Vol. II, p. 196.) Formerly a 48-inch stave length, and a 30-inch heading were required. (*Ibid*, Vol. II, p. 152.) The hogsheads were inspected and branded at the warehouse.

There was an inspection at each place daily, from the first of November to June first, holidays and Sundays excepted, by two inspectors and the third was called in case of dispute. Two able-bodied men could be employed by them at each warehouse to handle the tobacco and "pickers" were appointed by the county courts to separate the condemned tobacco from that which was "sound, well-conditioned, merchantable, and clear from trash." After June 1, 1802, the inspectors were required to brand the tobacco as first or second class, according to quality. (*Ibid*, Vol. II, pp. 144-147, 278, 456.)

but these were not legal tender even for tobacco, as a previous act[64] of June 28, 1792, required all court fees to be paid in money, and all fines and forfeitures in tobacco imposed by Virginia laws could be recovered in currency at the rate of a penny a pound of the weed.

The warehouses were required to be self-supporting, and at first the buildings and weights and measures were provided by the owners.[65] In accordance with an act[66] of February 10, 1798, regulating the inspection of tobacco, the proprietor rented the building to the inspectors, and the county court could compel him to keep the house in good condition with sufficient room for storage and to provide scales and weights, funnels, wharves, and other necessary conveniences. The State was responsible for tobacco and warehouse in case of fire.

Log cabins were in common use for such establishments until an act[67] of December 22, 1803, required all inspection warehouses to be built of "brick or stone or scantling enclosed with strong boards or planks well nailed on, or of logs so close as to keep safely and prevent any injury by the weather all produce that may be stored therein; to be floored with plank or timber and a good roof, shingles or plank well nailed on." A year was allowed the proprietors of existing establishments to comply with the specifications. From that time the buildings were more substantial. On the Kentucky at Jack's Creek[68] they were of stone and at Boonesborough the thick walls of a tobacco warehouse were standing some eighty years after construction.[68]

January 23, 1809, the county courts were vested with the power of establishing public warehouses under the regulations then in force. The location of an inspection was required to be at least three miles distant from any other on the same side of a river or creek, unless two-thirds of the justices of the county voted an exception to the rule.[70]

The owners of boats as well as of cargoes were fined for shipping uninspected or condemned tobacco,[71] until January 30, 1810, when the sections of the laws relating to the exportation of that commodity were repealed.[72] The inspection of hemp and flour for export was continued for a longer period,[A] and for a short while provision was made for the inspection[73] of salted beef and pork.[B]

[A]The act of December 18, 1792, prescribed the method of appointing inspectors of flour and hemp. (Littell, Vol. I, p. 135.) December 20, 1794, an inspection was authorized in twelve different counties. The preamble to the act reads: "Whereas, it is necessary and good policy requires that our flour and hemp trade should be put upon a respectable footing, which can only be done by establishing such regulations as will prevent the manufacturer from bringing to market such flour and hemp as will not pass inspection and entitle the merchant to preference in a foreign market," etc. The county courts were directed to choose the sites and appoint two inspectors in each county. No inspection could be established unless the prospective proprietor gave bond that he would erect a warehouse and furnish weights and scales within a specified time.

Flour, which must be of proper fineness and merchantable, could be inspected at the mills as well as at the warehouse. The barrels were required to be of sound and well seasoned timber, bound with twelve hoops, and of 196 to 204 pounds net capacity. The inspector was required to mark each cask with the name of the warehouse and quality of flour, fine or superfine, and furnish the owner with a certificate; receiving three pence per barrel for his services. The storage charges were six pence per barrel for three months and a penny for each additional month. (*Ibid*, Vol. I, pp. 258-260.)

Merchantable hemp was required to be winter or water rotted, dry, bright, clean, and well bound in bundles of at least one hundredweight each. The fee per hundredweight for inspection was three pence and for storage six pence for six months and one penny per hundredweight for each additional month. (*Ibid.*)

This law was inadequate, and the following year, December 19, 1795, the governor was directed to appoint two inspectors for specified places and penalties were imposed for the shipment of uninspected or condemned cargoes, or for counterfeiting the inspector's brand. Hemp bundles were increased to 112 pounds, and flour barrels limited to 196 pounds, with twenty-seven-inch staves, and seventeen and one half inches in diameter. There were a number of minor changes in the law. (*Ibid*, Vol. I, p. 330.) No provisions for the inspection of hemp and flour appear to have been made under these laws, the owners of the warehouses failing to give bond. By act of December 17, 1796, therefore, the governor was directed to appoint one inspector at each place designated for inspection, without requiring bond, and if the warehouses were inadequate, other buildings could be used for storage, and the inspection held on land or aboard the boats, a week or less before shipment. Storage fees were reduced and other specifications were altered by this act (*Ibid*, Vol. I, p. 378) and again by acts of December 16, 1802, and January 30, 1810. (*Ibid*, Vol. III, p. 23; Vol. IV, p. 167.)

By an act of January 31, 1815, the inspection of flour for export, unless demanded by the purchaser, was no longer required. (*Ibid*, Vol. V, p. 190.)

[B]An act of December 19, 1804, provided for the inspection of salted beef and pork at a number of the places, the inspector at each place designated to be appointed by the county court. For approval the meat was required to be carefully picked and packed in casks in good order for shipping with a sufficient

As a result also of the long distance commerce small settlements situated at the fords of the Kentucky where the warehouses were located grew into towns of considerable size. In 1786, Frankfort, on the land of James Wilkinson, and New Market, at the mouth of Dix River, and in 1787, Warwick, at Harrod's Landing on the property of James Beall in Mercer County were established[A] by special acts[74] of the Virginia legislature.

Boonesborough, already established as a town, became of greater importance as river commerce increased.[B]

Other towns sprang up which were not officially recognized.[C]

quantity of salt for its preservation. The barrels were to contain a minimum of 200 pounds and were to be branded as mess or prime according to the quality of the meat. For packing, branding, and furnishing a warehouse certificate, the inspector was to receive twenty-five cents a barrel from the owner. (Littell, Vol. III, pp. 237-239.) December 26, 1806, an act provided that the county court appoint two inspectors for each place specified. Three classes of meats were defined: mess, prime, and cargo. It was required that the barrels be of "seasoned white oak staves, clear of sap, with four nails in each chine hoop, and three in each bulge hoop, and be sufficiently tight to retain the brine, and each barrel to have fourteen good strong sound hoops." (*Ibid*, Vol. III, p. 321.)

November 22, 1806, an act repealed all laws requiring the inspection of beef and pork intended to be exported to any port or place within the jurisdiction of the United States. The preamble to the act reads: "Whereas, the several acts concerning the inspections of beef and pork have not answered the several purposes thereby intended and are found to be injurious to the exportation of those articles," etc. (*Ibid*, Vol. III, p. 329.)

[A]In an established town, the trustees were appointed by the legislature and the moneys devoted to public purposes came from the sale of lots or from voluntary contributions. In the incorporated town, the trustees were elected by the people and were given the power to levy a tax. (Robertson, Petitions Nos. 14, 46, pp. 60, 106.)

[B]The act establishing towns required plans to be made of them by the trustees and recorded in the county court. Collins (Vol. II, p. 214) gives a sketch of the town plat of Boonesborough from a copy of the original loaned him by John Stevens who at one time owned nearly all of the land included in the boundary. This plat shows the location of the fort, ferry, warehouse, springs, and roads, and is typical of all the Virginia towns. In 1789 there were 120 houses in Boonesborough and in 1810 there were 87 inhabitants. There are no other records of population given by historians. (For a full description see Geo. T. Ranck, "Boonesborough, a Pioneer Town of Kentucky; its origin, progress, decline, and final extinction." Filson Club Publications No. 16, 1901.)

[C]According to Collins (Vol. II, p. 20) Leestown was settled in 1776 by Hancock Lee, Cyrus McCracken and others. It is given as a town on Filson's Map, 1784, as is also Greenville a few miles below. An advertisement in the Kentucky Gazette, June 28, 1790, offers lots for sale in the town of Newport oppo-

Such was Leestown, one mile below Frankfort[A] on the eastern bank of the river, which is described by Jedidiah Morse[75] in his American Geography of 1789: "it is regularly laid out and is flourishing. The banks of the Kentucky River are remarkably high, in some places 300 and 400 feet, composed generally of stupendous perpendicular rock. The consequence is there are few crossing places; the best is at Leestown, which is a circumstance that must contribute to its increase."

Commercially the river towns compared unfavorably with highway centers situated on the tributaries, where the transmontane routes intersected those from the Ohio. Lexington, the terminal[76] of the "new road to Virginia," and Danville[B] on the Wilderness Road were the principal distributing points for the backwoods settlements.[C] They not only furnished river

site Frankfort where settlements had recently been etablished. Indians interfered with the founding of towns along the river until after the separation from Virginia, as is shown by the following account from Collins (Vol. II, p. 118):

"In 1786 or 1787 Captain Ellison built a block-house on the point at the confluence of the Kentucky and Ohio Rivers and was successively driven from his post in the two succeeding summers by a superior Indian force. In 1789-1790 General Charles Scott built a block-house on the second bank, in an elevated position and fortified it by picketing. This post was occupied until 1792 when the town of Port William (now Carrollton) was first laid out. The Indians were then troublesome." Port William was established a town by act of the Kentucky legislature, December 13, 1794. (Littell, Vol. I, p. 232.) The town of Preston on the opposite side of the river was established by act of December 21, 1795. (*Ibid*, Vol. I, p. 347.)

[A]Frankfort now includes the site of Leestown. There was formerly a ford at Devil's Hollow just above Benson Creek which enters the river at Frankfort, and another just below the creek at Leestown known as the lower ford. The name Frankfort, according to Collins (Vol. II, p. 242), is a corruption of Frankford, so called because a hunter, Stephen Frank, was killed while camping there in 1780. Surveys were made including a large portion of the site July 16, 1773, by Hancock Taylor for Robert McAfee who found more attractive bodies of land for settlement on Salt River. (*Ibid*, p. 249.) Other surveys were also made but there seems to have been no settlements established until after 1784. General Wilkinson testified in 1791 that the site then called Frankfort had formerly been known as Leestown bottom. (Robertson, Petition No. 99, p. 171.)

[B]Lexington, probably settled in 1779 (Collins, Vol. II, p. 180), was established a town in 1781 (Hening, Vol. XI, p. 100) and was incorporated in 1787. (*Ibid*, Vol. XIII, p. 191.) Danville was laid off by its original proprietor, Walker Daniel, in 1781 and was established in 1787. (Collins, Vol. II, p. 90.) The Census of 1790 mentions none of the river towns but gives the population of Lexington as 834 and of Danville as 150. Lexington was the metropolis of the district. Louisville had but 200 inhabitants.

[C]The early maps of Kentucky show the leading roads to have converged at these towns. (See Map, opposite p. 82, and Imlay's Map, Verhoeff, The Kentucky

traffic but were also receiving stations for goods brought overland from a distance and from local communities. The river towns in their isolated situation functioned mainly as shipping ports for outbound freight. Their rise at this time and their subsequent decline after Kentucky had become a State, mark the beginning and the end of long distance traffic on the river. Frankfort alone of those established by the Virginia Assembly has survived to the present day. It became the capital of the State. The first legislature of Kentucky adjourned in Lexington December 22, 1792, to hold its next session in that town[A] which had been selected as "the most proper place for the seat of government."

Mountains, p. 74.) From Danville the Wilderness Road extended to the Ohio at Louisville, by way of Lebanon, Bardstown, and Shepherdsville. It was intersected by a road which led south across the Cumberland River to Nashville, Tennessee, where it connected with the old Natchez Trace, and north across the Kentucky near Boonesborough to Lexington. From Lexington the principal roads led (1) to the Ohio at Limestone, passing through Paris and across the Licking at the lower Blue Lick Springs (see p. 46, Note C.); (2) to the Ohio at the mouth of the Licking opposite Cincinnati, passing along the Kentucky-Licking Divide; (3) southwestward to the Wilderness Road at Harrodsburg, crossing the Kentucky near the mouth of Dix River; (4) westward to the Wilderness Road near Louisville, crossing the Kentucky at Frankfort.

[A]With the exception of Louisville and Lexington all other sites considered for the capital were located on the Kentucky River—Petersburg (near Versailles), Legerwood's Bend, Delaney's Ferry, and Leestown. (Collins, Vol. II, p. 245.) Frankfort is situated on an old ox-bow bend of the river, the most favorable site the valley offers for the location of a city. This site referred to by the pioneers as the "great meadow" (The McAfee Journals, Woods, McAfee Memorial, p. 434) is described in the Navigator of 1811:

"Frankfort is seated in a flat or plain under a considerable hill to the N E while the Kentucky River runs around it to the S W in the form of a half moon. Part of the plain to the N W of the town is subject to inundation and consequently not built on. It used to be a stagnant pond but General Wilkinson, when stationed at Frankfort about the year 1795-1796, dug ditches through it and drained it of its noxious effluvia; the same practice has been continued by the inhabitants and the health of the citizens preserved. The river at Frankfort has the appearance of having left its old bed which may have run through a pleasant valley or glen (now a fine meadow) between the hill back of Frankfort and that whose point comes to the river just below the town and obliquely opposite the hill on the S W side of the river where the fracture by some great convulsion of nature may have taken place." The explanation offered for the formation of the bottom is correct but the catastrophic cause suggested is not in accord with the views of modern geographers. (See Note A, p. 8.) The bend of the old river extends in a semi-circle from the penitentiary by the way of the fair grounds to the river again, a short distance below Lock Number 4. Fort Hill, overlooking the town from the north, is an outlier formed by the river when it cut across the neck of the meander. (A. M. Miller, Geology of Franklin County, Kentucky Geological Survey, 1914.)

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57. *Ibid*, Vol. XII, p. 280.
58. *Ibid*, Vol. XII, p. 258; J. R. Robertson, Petitions of the Early Inhabitants of Kentucky, Petition No. 43, p. 102; No. 51, p. 113.

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65. *Ibid*, Vol. I, p. 150.
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CHAPTER IV

COMMERCE IN ITS RELATION TO RIVER IMPROVEMENT

For twenty-five years after the separation of Kentucky from Virginia, the Kentucky River although obstructed and unimproved possessed an importance as a trade route which all later expenditures of public moneys have been unable to re-establish. It had its full share in the unprecedented commercial activity induced by the Napoleonic Wars throughout the United States. These prosperous times are described by Seybert[1] in his Statistical Annals:

"Independent of our newly acquired political character, circumstances arose in Europe by which a new and extensive field was presented for our commercial enterprise. The most memorable of revolutions was commenced in France in 1789; the wars consequent to that event created a demand for our exports and invited our shipping for the carrying trade of a very considerable portion of Europe; we not only carried the colonial productions to the several parent States, but we also became the purchasers of them in the French, Spanish, and Dutch colonies. A new era was established in our commercial history; . . . Many persons who had secured moderate capitals soon became the most adventurous . . . . . Temporary benefits were mistaken for permanent advantages; so certain were the profits on the foreign voyages, that commerce was only pursued as an art; . . . . . the nature of foreign productions was but little investigated by the shippers of the United States; the demand in Europe for foreign merchandise, especially for that of the West Indies and South America, secured to all these cargoes a ready sale with a great profit; the most adventurous became the most wealthy and that without the knowledge of any of the principles which govern commerce under ordinary circumstances; no one was limited to any one branch of trade; the same individual was concerned in voyages to Asia, South America, the West Indies, and Europe. Our tonnage increased in a ratio with the extended catalogues of the exports; we seemed to have arrived at the maximum of human prosperity; in

proportion to our population we ranked as the most commercial nation; in point of value our trade was only second to that of Great Britain."

In October, 1795, a treaty with the United States was signed by Spain. It granted to Americans free navigation of the Mississippi with right of deposit at New Orleans. There followed the purchase[A] of Louisiana, putting an end to the restrictions which had discouraged all but the most venturesome traders.[2] Thereafter, farm products sent down the Ohio and its tributaries were exported in ever increasing quantities from New Orleans[B] to Europe and also to the West Indies.

[A]The treaty with Spain which was ratified April 25, 1796, guaranteed the right of deposit at New Orleans for only three years, with the provision that at the end of that time, should the right be withheld, another place near the mouth of the river would be substituted. The Americans could deposit their "merchandises and effects" in the port of New Orleans and export them without paying "any other duty than a fair price for the hire of the stores." (For treaty text see Snow's American Diplomacy, p. 106.) In 1802 the deposit privilege was withdrawn and the Spanish intendant assigned no equivalent place. Interruption to navigation again occurred but the difficulties were soon settled by the purchase of Louisiana from the French who had recently regained the territory which years ago had been lost to Spain. The Americans took possession December 20, 1803. (R. M. McElroy, Kentucky in the Nation's History, pp. 203, 267.)

[B]The delay and expense incidental to reshipment at New Orleans led to the building of sea-going vessels on the Ohio. The distance to the West Indies was less even from points on the Monongehela than by way of the alternative route across the mountains and the Atlantic ports. Michaux says that the inhabitants of Bedford, Pennsylvania, began to ship produce directly to the "Carribees" during the French Revolution. (Thwaites, Vol. IV, p. 145.) According to the same authority (p. 177) the inhabitants of Marietta, Ohio, were the first that "had an idea of exporting directly to the Caribbean Islands the produce of the country in a vessel built in their own town." This vessel they sent to Jamaica and the success of the expedition stimulated the shipbuilding so that soon afterwards vessels were launched at Louisville and Pittsburg and "expedited" to the Isles or to New York and Philadelphia. The dates of the construction of the various boats is uncertain as local accounts furnish conflicting data. The Kentucky Gazette under date of May 5, 1792, notes: "The sloop Western Experiment, Captain Charles Nicholson, built on the Monongahela and bound for Philadelphia, passed Limestone Saturday, the 20 of April."

The first two ships (vessels of two or more masts) were probably the St. Clair, built at Marietta, which reached Cincinnati April 27, 1801, and the Monongahela Farmer, built at Elizabeth, Pennsylvania, which reached Pittsburg May 13 of the same year. Mr. Hulbert gives a list of over fifty vessels built between 1800 and 1808. The embargo of 1807 and the introduction of the steamboat soon afterwards destroyed the shipbuilding industry. Most of the ships entered the West Indian trade at New Orleans, but some were purchased at Philadelphia and Baltimore and a few went to England, Spain, and other European countries. Steamboats were at first built on the plan of the sea-going vessels but later the maritime idea of keel and hold was abandoned and the engines were raised on deck. As late as March 24, 1821, the Niles' Weekly Register notes:

The colonies on these islands had long depended upon the United States for foodstuffs which were now required in unusual amounts to supply the naval and military forces stationed by the belligerents in their respective forts. Cooperage stock for the sugar and rum industries were added to the cargoes.[3] Temporary checks to exportation were caused by the peace of Amiens in 1802,[4] the embargo of 1807, and the War of 1812, but shipments to New Orleans were made annually. A decline in prices everywhere followed the peace in Europe but before the Ohio Valley could be greatly affected, the thriving cotton, rice, and sugar districts on the lower Mississippi afforded a home market for its products.[5]

When in 1799, improvement of the Kentucky was seriously considered its commerce had already expanded. Although many merchants still preferred the land routes to and from the Ohio, the cessation[A] of Indian attacks which had imperiled the life and property of boatmen encouraged others to send their goods by boat. For the accommodation of such traffic, regular transportation lines were in operation, the first having been established in 1795 as is indicated in a Cincinnati newspaper,[6] the Centinel of the North-Western Territory:

"The Messers. Johnsons of Kentucky are preparing to establish a line of steamboats to ply direct from Louisville to Havana; which is considered a matter of great importance to the western country." (For a description of shipbuilding on the Ohio, see Archer B. Hulbert, Western Ship-Building, The American Historical Review, July, 1916, pp. 720-733.)

[A] (See Note A, p. 44; also Verhoeff, The Kentucky Mountains, pp. 77-78.) Until after 1794 travelers would often retreat to the settlements at the first indication of the enemy's approach. The Kentucky Gazette of July 7, 1792, announced that during the preceding week several men and a family bound for New Orleans in two perogues, frightened by Indians at the mouth of Drennon's Creek, had abandoned the boats and cargo consisting of flour, tobacco, and whiskey valued at two hundred pounds. On the Ohio depredations continued until the banks of the river were comparatively thickly settled. Detachments of warriors and hunters were sent out by neighboring tribes to lie in wait for boats. The Indians, moreover, were succeeded by roving bands of white robbers, sometimes twenty or thirty in number, who attacked and plundered the boats and frequently murdered crew and passengers. An island in the vicinity of Henderson, Kentucky, was a favorite haunt for both robber and Indian. (Cuming's Tour to the West, Thwaites, Vol. IV, p. 268.)

Notice.—The subscriber informs the gentlemen, merchants and immigrants to Kentucky, that he will be at the mouth of the Kentucky river on the first day of February next, with a sufficient number of boats to transport all goods, etc., which they may think proper to entrust him with up the river. He will also keep a store-house for the reception of any goods which may be left with him. Carriage of goods to Frankfort, 50 cents per hundred: to Sluke's warehouse, 75 cents; to Warwick 100 cents; Dick's River, 125 cents.
Mouth of Kentucky, Jan. 15, 1795. Elijah Craig, Jr.

The Palladium, published at Frankfort, January 22, 1799, contains an advertisement of another line of boats.[1]

"THE BOATING BUSINESS

The subscriber having furnished himself with several good BOATS, and engaged a number of experienced HANDS, respectfully offers his Services to Merchants, Traders, and Others, who may have Goods, etc., to send to any place on the Western waters.

Those who may think proper to employ him, may rest assured that the greatest care will be taken of the articles confided to him, and the strictest punctuality observed in the delivery. John S. Travis.
Port-William (Mouth of Kentucky).
September 3, 1798.
Warehouse-Room for depositing Goods can be had as above.

Moreover, products from the Bluegrass farms[A] were annually descending to the southern markets and within the succeeding two decades long distance traffic on the river attained its maximum development.

[A]Martin Hawkins in his survey of the river showed in some detail the heavy losses caused by obstructions. At one shoal a single fallen tree necessitated portage during low water, and in five years had cost the shippers $3,000. It was promised that the improvement would reduce transportation rates from "4s a hundred to 1s 6d up the river and from 3s to 1s a hundred down the river." Flour had now become an important article of export, and it was especially to facilitate the transportation of this commodity that the improvement of the stream was urged. Low water and ice generally delayed shipment until spring, when warm weather caused the flour to spoil. (See Martin Hawkins' Survey, Appendix, pp. 222-223.) Daniel Clark in his memoir to Secretary of State Pickering, on the commerce of Louisiana, under date of April 18, 1798, writes: "The quantity of different productions imported from the Ohio since the opening of that trade has varied

At first the planters themselves accompanied their goods south and negotiated the exchange. The arduous[A] journey under the most favorable circumstances, however, consumed five or six months, so that middlemen were soon found necessary. The following advertisements[8] by various merchants

considerably from year to year. In the beginning tobacco was the principal export from Kentucky, and at one period from one thousand five hundred to two thousand hogsheads came down the Mississippi annually for three or four years; they at the same time exported a great quantity of butter, lard, and salt provisions. Within the last three years the exportation of tobacco has considerably diminished and flour seems to take its place. Hemp has likewise been imported from thence in considerable quantities; was formerly reshipped from hence to the Atlantic States but what now comes is manufactured here. Cordage is likewise imported from Kentucky, where some rope-walks are set up; and in future it may be presumed little or no hemp will be exported from New Orleans; for the encouragement of the manufactory here that article is exempt from duty on importation." (Annals of Congress, 1st Session, 10th Congress, Appendix, pp. 2731-2736. Washington, 1853.)

The western flour, in time, monopolized the New Orleans market, but at first it was considered inferior to its competitor from the eastern cities, and brought a very low price, eighteen to twenty shillings a barrel. According to Clark, it was of "very bad quality and was only made use of for biscuit or in times of scarcity." It gradually improved and in 1792, the "best kind was supposed equal to that manufactured in Philadelphia," but as it was put up negligently and did not keep as long it was not so highly esteemed. (*Ibid.*)

[A]The tax upon the health of those engaged in the New Orleans trade is indicated in the preamble of an act of the Kentucky legislature, February 5, 1817, incorporating the Louisville Hospital: "Whereas it is represented that of those engaged in navigating the Ohio and Mississippi rivers many persons, owing to the fatigue and exposure incident to long voyages become sick and languish at the town of Louisville where the commerce in which they are engaged sustains a pause occasioned by the falls of the Ohio river; that the charity of citizens of that town and county is no longer able to administer to these poor unfortunate persons the support and attention which the necessities of the latter and the humanity of the former would seem to demand and prescribe; that the growing character of Louisville as a place, as well of import as export, and the growing commerce of this state and of the western country connected with that place threatening to throw an increasing mass of unfortunate sick upon the citizens of that town and county, to the comfort and support of whom the resources subject to the exactions of charity would be unequal and applied as individual sympathy might dictate unavailing," etc. (Littell, Vol. V, p. 574.)

In the year 1805 the legislature of Mississippi established at Natchez a hospital for the "reception and relief of indigent boatmen." April 25, 1822, the assent of Congress was refused to an act of that legislature, imposing a tax on vessels and their crews arriving at Natchez for the support of the hospital, since the act carried into effect would operate oppressively upon those employed in the navigation and in the business and trade of the Mississippi. (American State Papers, Vol. XV, Report of Senate Committee, pp. 658-772.)

The Mississippi legislature, in asking the consent of Congress, urged that "a citizen who performs a voyage of two or three thousand miles upon our inland waters and subjects himself to the horrors of shipwreck, poverty, and disease far from his home and his friends is surely as much entitled to the charitable provision of Congress as the mariner who makes his voyage upon the ocean." (*Ibid*, p. 659.)

appeared in the Kentucky Gazette of Lexington and are typical of many others published in the local papers of the day. Some of them were repeated year after year.

(November 9, 1793): "I want a few good Boatmen to conduct my Boats to the city of New Orleans. Any person desirous of engaging will meet with good wages and treatment. Application to be made on or before the tenth day of December, as the boats will sail from Frankfort shortly after that period. Cash and Merchandise will be given for Hog's Lard, Country Linen, Beef Cattle, Live Pork, Sugar, Wheat, Rye, Corn, and Oats by the Subscriber; who has for sale at this place a neat assortment of Merchandise suitable to the present and approaching season on the lowest terms for Cash or the above articles of produce.

"James Lemon, Georgetown, November 16."

(March 23, 1793): "Wanted, a number of hands to work my boats down to New Orleans; none need apply but such as can be well recommended and those will be preferred who have been already down the river. Generous wages and good treatment will be given to such as may be employed by John Moylan."

(January 25, 1794): "Wanted immediately, a number of men to conduct boats to the city of New Orleans, for which generous wages will be given by Elisha Winters and Co."

(February 28, 1795): "About twenty men will receive good wages by applying to John Fowler, of Lexington, or Jordan Harris for services to be rendered in navigating boats from Frankfort to New Orleans. The Boats will be ready about the 20th of next month. February 26, 1795."

(November 26, 1796): "The subscribers will engage a number of Able Bodied Men to conduct their boats to New Orleans. Liberal wages will be given. Apply to Seitz and Lauman, Lexington. A generous price will be given for clean Wheat, Hemp, and Tallow, in Merchandise."[A]

Under the same date other merchants advertised for "Country produce suitable for the New Orleans

[A]Some of the merchants sold, at the wharf, boats loaded for shipment. Green Clay, under date of January 24, 1804, advertised that he had on hand about 30,000 pounds of tobacco three or four years old, and bacon and whiskey sufficient to load a boat fifty feet long, which would be ready the first day of March. The boat and cargo would be sold on credit if bond and good security were given. (Kentucky Gazette, January 31, 1804.)

Market."[A] A resident of Lexington writes[9] in 1817: "In general farmers command a ready cash sale for their produce, the old custom of carrying it to the New Orleans markets is nearly superseded by a new order of tradesmen, who are a medium between the Western farmer and the New Orleans markets."

In return for agricultural products, goods were brought to Kentucky by way of New Orleans from the West Indies, France, and India, but the importation of merchandise from England[B] by way of the eastern cities[10] was much more important. The commercial center was Lexington, situated on Elkhorn Creek, and for a time the metropolis of the west.[C] Twenty-five miles distant from Frankfort, its shipping point on the Kentucky, the

[A]By the year 1802 flour had become one of the chief articles sent from Kentucky to New Orleans. A statement of the inspector of the port at Louisville, published in the Kentucky Gazette, August 6, 1802, shows that from the first of January to the first of July 85,570 barrels had gone out of the port bound for Louisiana. According to Michaux (Thwaites, Vol. III, p. 240) more than two-thirds of the cargoes came from Kentucky and the details of shipment are described:

"In all the United States the flour that they export is put into slight barrels made of oak and of an uniform size. In Kentucky the price of them is about three-eighths of a dollar (fifteen pence). They ought to contain ninety-six pounds of flour which takes five bushels of corn, i. e., wheat, including the expenses of grinding.

"The freightage of a boat to convey the flour to Low Louisiana costs about a hundred dollars. They contain from two hundred and fifty to three hundred barrels and are navigated by five men of whom the chief receives a hundred dollars for the voyage, and the others fifty each. They take from Louisville, where nearly the whole embarkations are made, from thirty to thirty-five days to go to New Orleans. They reckon it four hundred and thirty-five miles from Louisville to the *embouchure* of the Ohio, and about a thousand miles thence to New Orleans, which makes it upon the whole, a passage of fourteen hundred and thirty-five miles; and these boats have to navigate upon the river a space of eight or nine hundred miles without meeting any plantations. A part of the crew return to Lexinton (*sic*) by land which is about eleven hundred miles, in forty or forty-five days. This journey is extremely unpleasant and those who dread the fatigues of it return by sea. They embark at New Orleans for New York and Philadelphia whence they return to Pittsburg and thence go down the Ohio as far as Kentucky."

[B]The merchants would purchase cotton, indigo, sugar, and other products of lower Louisiana and send them by sea to the mercantile houses in Philadelphia and Baltimore and thus cover their first advances. The trip by sea from New Orleans usually took twenty or thirty days. (Michaux's Travels, Thwaites, Vol. III, p. 159.)

[C]In 1803, Pittsburg had but 2,000 inhabitants, while Lexington had over 3,000. (Louis Pelzer, Economic Factors in the Acquisition of Louisiana, Mississippi Valley Historical Association, Vol. VI, pp. 123-125.)

town received freight by road both from that river and the Ohio and sent out its products over the same routes. As formerly, the leading highways[A] of the State converged here. Michaux[11] writes in 1802:

"The majority of the inhabitants of Kentucky trade with Lexington merchants; they receive their merchandise from Philadelphia and Baltimore in thirty-five or forty days including the journey of two days and a half from Limestone, where they land all the goods destined for Kentucky. The price of carriage is from seven to eight piasters per hundredweight . . . . . It is an easy thing for merchants to make their fortunes; in the first place they usually have a twelve months credit[A] from the houses at Philadelphia and Baltimore and in the next as there are so few they are always able to fix in their favour the course of colonial produce which they take in exchange for their goods; as, through the extreme scarcity of specie most of these transactions are done by way of barter; the merchants, however, use every exertion in their power to get into their possession the little specie in circulation; it is only particular articles that are sold for money, or in exchange for produce, the sale of which is always certain, such as the linen of the country or hemp. Payments in money always bear a difference of fifteen or twenty per cent to the merchants' profits. All the specie collected in the course of trade is sent by land to Philadelphia; I have seen convoys of this kind that consisted of fifteen or twenty horses. The trouble of conveyance is so great that they give the preference to Bank bills of the United States which bear a discount of two per cent. The merchants in all parts take them but the inhabitants of the country will not through fear of their being forged. I must again remark that there is not a single species of colonial produce in Kentucky except *gensing* that will bear the expense of carriage by land from that state to Philadelphia; as it is demonstrated that twenty-five pounds weight would cost more expediting that way, even going up the Ohio, than a thousand by that river without reckoning the passage by sea, although we have had repeated examples that the passage from New Orleans to Philadelphia or New York is sometimes as long as that from France to the United States."

[A]See p. 77, Note C.

The business carried on by the merchants was in a high degree speculative and fortunes were lost as readily as they were gained. Prices fluctuated constantly, timely information concerning markets was not at hand, agents were unreliable, and above all the system of credits was inadequate. The majority of the merchants were men of small capital who could ill afford to assume the risks incidental to the long river transportation. They were enabled to increase their shipping when a Lexington company was chartered,[12] December, 1802, to insure cargoes against marine accident and loss.[A] The company was also granted banking privileges and by issuing transferable notes further assisted the mercantile transactions.[B]

[A]The charter granted the Kentucky Insurance Company December 16, 1802, was to remain in force until January 1, 1818, and during that period no similar company was to be incorporated, thus assuring it a monopoly. It was authorized to acquire and hold corporate property to the value of $150,000 and to issue stock. By act of February 3, 1818, the insurance privileges were extended to 1820. The company was purely a marine institution. "It was not liable for any loss unless it amounted to five per cent. of the cargo insured nor for more than five-sixths of the value of the cargo; and the insurance ceased on vessels and cargo on arrival of the vessel in port unless otherwise expressed in the policy." (Acts of Kentucky. J. S. Johnston, Memorial History of Louisville, Vol. I, p. 304.)

[B]This was the first bank in Kentucky. The notes of the company were in great demand and they passed in New Orleans at from 101½ to 102. (E. C. Griffith, Early Banking in Kentucky, Proceedings of the Mississippi Valley Historical Association, 1907-1909, p. 173.) The banking privileges of the insurance company were withdrawn February 3, 1818, but the Bank of Kentucky had been chartered by act of December 27, 1806, and was then in operation. (Acts.) In 1818, the State chartered forty independent banks, with an aggregate capital of $8,520,000, and November, 1821, the Bank of the Commonwealth, at Frankfort, with a capital of $2,000,000. These banks were not organized on sound banking principles. Notes were issued freely without adequate protection for note holder or depositor. All of them ended in financial disaster caused in part by conditions following the peace in Europe. By the year of 1830, there were no state banks doing business in Kentucky but there were two branches of the United States Bank, one in Lexington, the other in Louisville. When it became evident that the charter of that institution would not be renewed, the legislature at its sessions of 1833, 1834, 1835, established three banks on a sounder financial basis but the increase in paper money issued by them again caused speculation which ended in general bankruptcy throughout the State. Prosperity did not return until the close of 1844.

During this period (1802-1844) Kentucky pushed to its extreme experimental issue, the theory of fiat money, and there was much that was fictitious and only apparently prosperous in many commercial activities based upon it. The rapid growth, however, of the states in the Mississippi valley with whose people Kentucky traded, furnished an assured foundation for successful banking operations when properly conducted, and the banking institutions from the beginning served and encouraged the southern trade. (Duke, History of the Bank of Kentucky, p. 34.)

In a short time manufactured articles[A] made up a large proportion of the downstream cargoes, for upon factories[B] in the Bluegrass section of the basin many of the scattered settlements on the Ohio and Mississippi depended for supplies. There were a number of establishments along the river[C] but inaccessibility to the surrounding country prevented their growth.[D] Lexington was the industrial as well as the commercial center of the State. Niles, in the Weekly Register of January 28, 1815,

[A]See p. 85, Note A; p. 88, Note A.

[B]The great distances, both from New Orleans and the eastern cities, gave a monopoly value to manufactured products and many industries were established at a very early date. At Georgetown, Scott County, on a branch of Elkhorn Creek, the Reverend Elijah Craig, a Baptist minister, built, in 1789, the first fulling-mill and ropewalk in the State, and between 1791 and 1793, a paper-mill. The first Bourbon whiskey in the State was also manufactured at the fulling-mill in 1789. At Danville, Boyle County, in 1790, the first cotton factory in the west was started. At Lexington, the first nail factory in the west was established in 1801. (Collins, Vol. I, p. 816.)

[C]The following establishments, located respectively at Cleveland's Landing, Fayette County, and at East Frankfort, about a mile above the present site of Frankfort, are advertised in the Kentucky Gazette (quoted in Moore, A History of Hemp in Kentucky, etc., pp. 21, 25):

"The subscriber informs his friends and the public, that his hemp mill, lately built, is now in complete order and ready to take in hemp for the purpose of milling the same; to be well done and fit for the hackle for one eighth part of the quantity brought to mill. One bed is 120 pounds and can be delivered in one hour and a half after the same is put in; one wagon load can be done in two days. Those who favor the said mill with their custom, will find their business executed with care and dispatch by Eli Cleveland. N. B. Hemp not to be brought twisted." (February 16, 1793.)

"The subscribers being about to open a ropewalk on the north bank of the Kentucky River about one mile above Frankfort wish to purchase about twenty tons of hemp delivered at any of the inspections on said river for which they will give twenty-six shillings to be paid in cash in three months. We also wish to hire a number of boys or young men, black and white, to assist in the walks at Georgetown and near Frankfort to whom generous wages will be given, their board and washing found, while they may learn a valuable trade. Elijah Craig and Sons." (May 3, 1798.)

[D]Next to flour and meats, articles manufactured from hemp were the chief commodities sent through to New Orleans. The cultivation of hemp was begun in Kentucky in 1775, and from that time to the present the Bluegrass has been one of the main sources of supply in the United States. After a process of rotting, the fibre is separated from the stock, cleaned and twisted by hand into two or four-pound weights and made into bales for market. As slave labor increased in Kentucky the breaking and cleaning of hemp was accomplished as to-day on the farm, but during the early years of the industry, when labor was scarce, the work was done in mills. Until after the Civil War the hemp was shipped, as thus prepared, or manufactured into various articles. At first cordage and sail-cloths were the chief products, and these were sent to the shipyards of Louisville and Marietta (see p. 83, Note B) but as cotton culture increased in the south

says:[13] "This town (Lexington), which promises to be the great inland city of the western world, is situated in the center of an extensive plain of the richest land. It is the seat of a great commerce and has many flourishing manufactures. The population is already between six and seven thousand souls .... Mechanics of all descriptions receive nearly double the price for their labor that they get to the eastward, and the expenses of living are not more than one half. They are wanted to keep pace with the rapid improvement and increase of manufactures in that place."

In 1817 there were over sixty factories in the town, representing an investment of about two million dollars. The plants and capital were listed by a number of "judicious men" of the day, as follows:[14]

Twelve cotton manufactories, £67,500; 3 woolen manufactories, £32,600; 3 paper manufactories, £20,250; 3 grist-mills, £16,375; gun powder mills, £9,000; lead factory, £14,800; foundries for casting iron and brass connected with a silver-plating establishment, £9,000; 4 hat factories, £15,000; 4 coach factories, £12,600; 5 tanners and curriers, £20,000; 12 factories for cotton bagging and hempen yarns, £100,400; 6 cabinet-makers, £5,600; 4 soap and candle factories, £12,150; 3 tobacco factories, £11,450; sundry others, £120,000; total amount of capital employed in the manufactories of Lexington, £467,225.

By this time the counties above the Bluegrass had begun to make shipments. Occasional boat loads of coal had reached Frankfort from the Three Forks. Establishments on Red River had sent down small quantities of iron, and ten thousand to

factories were kept busy producing bagging for covering and rope for tying cotton bales. Since 1870 the production of hemp has been proportionately greatly reduced by competition with sisal, jute, and Manila hemp which have displaced the Kentucky product in the southern cotton market. It is now used chiefly in the manufacture of commercial twines and twine for binding grain, and some of it goes into ship cordage and sail-cloth. (Brent Moore, The Hemp Industry of Kentucky.)

fifteen thousand bushels of salt were descending annually in flats from South Fork and its tributaries.[A]

The bulk of the traffic, however, was confined to the Bluegrass section and especially to the sixty-five miles between Frankfort and the mouth which proved fairly satisfactory for navigation.[B] Here the annual commerce[C] was worth more than

[A] See pp. 156, 159.

[B] Jedidiah Morse in 1812 (American Universal Geography, p. 498), states that the river was navigable for boats of "considerable size" for 180 miles during the "winter tides," but that for about one half the year, navigation above Frankfort by such craft was impossible.

[C] The following statement gives the details. The figures are for public warehouses. There were also a number of private warehouses and the total commerce was probably considerably greater than recorded.

EXPORTS

(From three warehouses in Frankfort and Leestown, one mile below.)

14,590 barrels of flour	$87,540.00
2,148 barrels of whiskey	1,074.00
2,584 barrels of beef and pork	38,760.00
282 hogsheads of tobacco	14,100.00
750 barrels of lard	15,000.00
642 pounds of manufactured tobacco	19,260.00
1,800 pieces of bagging	27,000.00
4,954 coils of bale rope	49,540.00
12 cables	3,000.00
4 bales of spun yarn	400.00
30,000 pounds of bacon	30,000.00
1,263 boxes of candles	12,630.00
1,800 boxes of soap	18,000.00
965 reams of paper	3,860.00
800 kegs of powder	4,000.00
Total	$324,164.00

(From five warehouses between Frankfort and the mouth.)

2,450 hogsheads of tobacco	122,500.00
Total	$446,664.00

IMPORTS

(Into Frankfort and Leestown.)

135 hogsheads of sugar	7,000.00
3,456 barrels of salt	34,560.00
100 tons of iron	25,000.00
234 boxes of salmon	6,020.00
34 pounds of fish	850.00
57 crates of earthen ware	4,000.00
1 pipe wire	700.00
10 barrels of pecans	120.00
10 barrels of nails	200.00
740 barrels of porter	11,100.00
74 tons of dry goods and groceries	222,000.00
Total	$312,630.00

(Report of Commissioner, dated February 8, 1819, House Journal, 1818-1819, pp. 313-314.)

$750,000, its volume comparing favorably with that of to-day. It consisted of whiskey, flour, bagging, and rope, together with tobacco and other raw material destined for the New Orleans market. Merchandise and heavy commodities such as iron and salt were freighted upstream from the Ohio.[15]

Frankfort was the shipping center[A] but public warehouses built for the storage and inspection of tobacco,[B] flour, hemp,[C] beef, and pork,[D] as well as numerous private establishments dotted the banks of the stream from its mouth to the mountain region. Boat-building was an industry of some importance in the small river towns,[E] where flatboat and barge, keel-boat and pirogue, and even sea-going sailing vessels were constructed.

[A]The Navigator of 1814 notes the erection at Frankfort of a "large warehouse for the storage of goods," which centered here "from different parts of the State to descend the Kentucky River to the Ohio." (Zadoc Cramer, The Navigator, Pittsburg, 1814.)

[B]There were two tobacco warehouses on Red River and one was located on Station Camp Creek, but with these exceptions, all of more than forty establishments authorized between 1792 and 1810 to be opened on the river were in the Bluegrass. (For a full list of the establishments see Appendix, p. 231.)

[C]The act of December 20, 1794, authorized the inspection of flour and hemp (Littell, Vol. I, p. 258) in each of the counties of Franklin, Fayette, Mercer, and Woodford, but these articles were probably not inspected until after 1796. (See Note A, p. 75.) By act of December 19, 1798 (Littell, Vol. I, p. 330), some half dozen of the tobacco warehouses on the river were designated as places of inspection. (See Appendix.) Subsequent acts provided for inspection at all but a few of the tobacco warehouses on the river and at the following additional localities: (1) Mouth of Greer's Creek, Woodford County, December 14, 1796, land of David Mitchell (Littell, Vol. I, p. 370). (2) Mouth of Jessamine Creek, Fayette County, December 4, 1796, land of John Lewis (*Ibid*, p. 370). (3) Frankfort, December 19, 1801, inspection of flour at the warehouse of Otto Beatty (*Ibid*, Vol. II, p. 456). (4) Lexington, December 13, 1798, inspection of hemp (*Ibid*, Vol. II, p. 196). (5) East Frankfort, December 22, 1798, inspection of hemp at the ropewalks of Elijah Craig (*Ibid*, Vol. II, p. 232).

[D]The act of December 19, 1804, had authorized the inspection of beef and pork at a number of the tobacco warehouses on the river—Port William, Frankfort, Boonesborough, Hogans, Curd's, Quantico, Bush's Landing, Jack's Creek. See Note B, p. 75. (*Ibid*, Vol. III, p. 237.) By act of December 26, 1805, beef and pork were to be inspected at the mouth of Silver Creek, Madison County (Goggin's warehouse), at Clarke's and Smith's Iron Works on Red River, at Warwick, Mercer County, and at the mouths of Howard and Drowning Creeks. (*Ibid*, Vol. III, p. 321.) By the same act, Georgetown, Fayette County, on Elkhorn Creek, was granted an inspection.

[E]The Frankfort boat-yards were the most extensive, but there were others at a number of places.

A merchant, under date of March 30, 1801, advertises in the Kentucky Gazette: "For sale, three or four boats, forty-five by fourteen feet, to be built in the strongest and best manner, and delivered at Boonesborough at any time

A traveler, in 1807, noted that three "brigs" had been built above the bridge at Frankfort and sent down the Ohio and Mississippi Rivers.[16] By the year 1810, according to the Navigator,[17] a number of "vessels of burden" constructed at that place had been "freighted" with the produce of the county to "New Orleans, West India Islands, etc."[A]

Steamboats navigated the Kentucky soon after their appearance in the west but they were not in common use for many years. The Navigator[18] again refers to Frankfort in 1810: "A steamboat—that is a large boat to be propelled by the power of steam—was on the stocks a little above town. She is intended for the trade of the Ohio and Mississippi Rivers." There are no records of a voyage having been made by a steamboat until several years later. According to Collins:[19] "April 28, 1816 (only four and a half years after the first steamboat in the West) a steamboat made by Bosworth and West on Mr. West's model, left the mouth of Hickman Creek, on the Kentucky River in Jessamine County, for New Orleans. This boat, an editorial notice in the Kentucky Gazette says, was upon a plan distinct from any other steamboat then in use, and on a trial against the current of the Kentucky River at a high stage more than answered the sanguine expectations of her owners (a company of Lexington gentlemen) and left no doubt that she

when required, after ten days previous notice, for which hemp or good horses will be received in payment by Thomas Hart. Also a quantity of cable rope may be had at the same place by applying to Maj. Jno. Wilkinson." In the issue of January 25, 1803, "Boat Building" is advertised: "The subscribers take this method to inform the public that they now have on hand at Bowling's landing on the Kentucky River, Ten Orleans Boats for sale. Any person applying, can have one completed by giving one week's notice. For terms, apply to Ezariah Prather at Sell's Mills or Nathaniel Morrison or Stephen Reid at the Landing. January 19, 1803." The industry flourished at Boonesborough for many years. As late as 1871, a small steamer, the "Daniel Boone," was built at that place. (Collins, Vol. II, p. 316.)

[A]The Kentucky Gazette, of May 17, 1803, notes that on May first the "Schooner Go-by" of Frankfort had passed the Falls of the Ohio.

could stem the current of the Mississippi with rapidity and ease.[A] She did not return."[B]

In 1818, the Kentucky, a steamboat[10] of eighty tons burden, was put into commission between Frankfort and Louisville. Built at Frankfort by the firm of Hanson and Boswell it was the first to operate between the two points. A number of other steamers were constructed about the same time, and in 1820, and perhaps earlier round trips were made between Frankfort and New Orleans.[C]

[A]Experiments in steam navigation were made at a very early date in Kentucky. John Fitch, an inventor, settled about 1780 at Bardstown, Nelson County, where he built a model of a steamboat. In 1786, he ran an experimental steamer in Pennsylvania on the Delaware River. The boat was propelled by paddles suspended by the upper ends of their shafts and moved by a series of cranks. In 1787, 1788, and 1789, boats of greater power were operated successfully by Fitch on the same river, but he was unable to obtain financial backing and finally returned to Kentucky, where, despondent over his failures, he committed suicide. The model of a boat left by Fitch to a friend in Bardstown was destroyed by fire in 1804.

Models of steamboats had been built by other inventors in the United States and in Europe, but Fitch's boat was the first one that worked in practice. The priority of invention was disputed by James Rumsey, a Virginian, who lived for a time in Kentucky. Filson, in 1784, mentions "mechanical boats" as invented by Rumsey and McMacken but these were probably not run by steam (see p. 84, Note A.) The evidence seems to prove that Fitch was the first inventor to successfully propel boats by steam. (Memorial to John Fitch, by Mrs. Ben Johnson, submitted to the Committee on the Library, House of Representatives, 63rd Congress, Third Session, February 27, 1915; American Encyclopedia; Collins, Vol. II, p. 649; Memoir of John Fitch by C. Whittlese in Park's American Biography; Biography of Fitch by Thompson Westcott, Philadelphia, 1857.)

In 1794, Edward West, a resident of Lexington, successfully operated the model of a steamboat on Town Fork of Elkhorn Creek. The stream had previously been dammed up near the center of Lexington for the purpose. "This miniature steamboat had no fly-wheel but to overcome the dead point, the piston-rod was made to strike metallic springs at every motion given by the steam." Mr. West did not receive a patent for his invention until July 6, 1802. (Collins, Vol. II, p. 174.) A remnant of the steam engine was for a time preserved in the museum of the Eastern Lunatic Asylum at Lexington. (Samuel D. McCullough, My Early Reminiscences of Lexington, Kentucky, unpublished manuscript, 1871, Public Library, Lexington.) It is now among the collections of the State Historical Society, Frankfort.

[B]The sailing date of the steamboat was April 21, 1816. (Kentucky Gazette, April 22, 1816; see Appendix, p. 230.) The boat was in danger of confiscation in Louisiana where Livingston's permission was necessary before a steamer was allowed to navigate. (*Ibid.*)

[C]Conflicting data concerning the steamer Kentucky have been recorded. (See p. 100, Note A.) An extract from the "Log Book" of the steamer Etna, de Hart en route from New Orleans to Louisville under date of June 26, 1817, notes the passing of the "steam-boat Kentucky seven days from the Falls." (Morris Birkbeck, Notes on a Journey in America, etc., p. 144. 1818.) The Kentucky

At this time the small craft from the Kentucky was at no great disadvantage on the Ohio for here also steamboat navigation was in an experimental stage. After the famous trip of the Orleans in 1811, numbers of steamers had descended to New Orleans but most of them had met with serious mishaps on the way so that it was difficult to procure freight for even the most successful. In 1815 the Aetna, built at Pittsburg, reached the southern port but there engaged in the business of towing on the Mississippi for she found it impossible[21] to "get a trip of freight up the river as shippers preferred to employ barges to the Falls at eight cents per pound."

One authority writes[22] in 1817: "The price of boating goods from New Orleans to Louisville (1,412 miles), is from 18s to 22s and 6d a hundred. The freight from New Orleans hence is 3s, 4½d to 4s, 6d a hundred. The average period of time which boats take to go to New Orleans is about twenty-eight days; that from New Orleans ninety days. Steam vessels effect the same route in an average of twelve days down and thirty-six days up when their machinery does not meet with an accident."

Steamless craft on the Ohio had been improved in speed and capacity[A] and the freight brought upstream from New Orleans

Reporter, Lexington, May 3, 1820, contains an advertisement for through freight to be carried by a steamer from Leestown to New Orleans: "On the first rise of water in the Kentucky River the steamboat Providence will leave Leestown one mile below Frankfort for New Orleans. Independent of the freight I shall put on board the steamboat she will be able to carry from 150 to 200 tons. Any person having property at a place which they wish shipped to New Orleans will have an opportunity of freighting it in the above boat," etc. An agent from Lexington accompanied the boat and attended to the business. In another issue of the Reporter (August 23, 1820), a Lexington merchant advertises for sale, "New Orleans goods" received by the steamer Fayette.

[A]Mechanical boats worked by horses had been successfully operated. In 1785 the Spanish Minister, Gardoqui, described a boat invented by John Fitch which moved against the current by means of a wheel fixed in its center worked by a horse. The "navigation of boats by horses" was a plan of Fitch's, for which he memorialized the Kentucky legislature for aid in 1798, describing the invention in these words. (House Journal, January 12, 1798, p. 35. John Mason Brown, Political Beginnings of Kentucky, p. 98, Filson Club Publications No. 6.) Cuming

had increased in quantity[A] but commerce still moved in the old trade route of Wilkinson's day. Morris Birkbeck,[22] in his record of a journey from "the Coast of Virginia to the Territory of Illinois," notes in 1818:

"There are about two thousand people regularly employed as boatmen on the Ohio and they are proverbially ferocious and abandoned in their habits though with many exceptions, as I have good ground for believing. . . . . Five hundred persons every summer pass down the Ohio from Cincinnati to New Orleans as traders or boatmen and return on foot. By water the distance is seventeen hundred miles and the walk back a thousand. Many go down to New Orleans from Pittsburg which adds five hundred miles to the distance by water and three hundred by land. The store-keepers (country shopkeepers we should call them) of these western towns visit the eastern ports of Baltimore, New York, and Philadelphia once a year to lay in their stock of goods; an evidence it might seem of want of confidence in the merchants of those places; but the great variety of articles and the risk attending their carriage to so great a distance, by land and water, render it necessary that the store-keepers should attend to their purchase and conveyance. I think the time is at

in his tour down the Ohio in the spring of 1808 (Thwaites, Vol. IV, p. 264), describes a boat which he met a short distance below Shippingport (Louisville): "A keel of forty tons came to the landing at same time we did. She was worked by a horizontal wheel kept in motion by six horses going round in a circle on a gallery above the boat by which are turned two cog wheels fixed each to an axle which projects over both gunwales of the boat, one before and the other behind the horizontal wheel. Eight paddles are fixed on the projecting end of each axle, which impel the boat about five or six miles an hour so that she can be forced against the current about twenty miles a day. One Brookfield, the owner, who conducts the boat, had her built last year about two miles above Louisville in Kentucky, and then went in her to New Orleans, from whence he was now returning, disposing of a cargo of sugar from place to place in his ascent. He expected to get home and commence a second voyage in about a month. Seven horses had died during the voyage and he had only two remaining of the first set he had commenced with." See p. 96, Note A.

[A]The floating equipment was limited and not more than 2,000 tons could be transported up the river during the year. (James Hall, The West, Its Commerce and Navigation, p. 133.) "Previous to the year 1817, the whole commerce from New Orleans to the upper country was carried in about twenty barges averaging one hundred tons each and making but one trip in the year so that the importations from New Orleans in one year could not have much exceeded the freight brought up by one of our largest steamboats in the course of a season. On the upper Ohio there were about one hundred and fifty keel-boats of about thirty tons each which made the voyage from Pittsburg to Louisville and back in two months, or about three such trips in the year." (*Ibid*, p. 13.)

hand when these periodical transmontane journeys are to give place to expeditions down the Ohio and Mississippi to New Orleans. The vast and increasing produce of these states in grain, flour, cotton, sugar, tobacco, peltry, timber &&& which finds a ready vent in New Orleans will be returned through the same channel in the manufactures of Europe and the luxuries of the east to supply the growing demands of the western world."

The benefit that would accrue to the State from an efficient steamboat service on the Ohio and its tributaries, was recognized at this time. New Orleans, already the chief market for its products, would be substituted for the eastern cities as a base of supplies, and commerce would be relieved of heavy expenses incidental to the round-about trade route. Governor Shelby, in his message to the legislature[24] in 1815, said: "The navigation of the Ohio and Mississippi Rivers by steamboats regularly sailing up and down those waters affords to our country a fair prospect of receiving many of our imports upon much cheaper terms than can be obtained by bringing them from the ports of the eastern states. Should this succeed it will also be highly advantageous in opening a direct barter of our export produce for our imported goods thereby saving to the State the commissions and percentages of the intermediate agents and merchants employed in our present circuitous trade."

State laws were enacted to encourage the use of steamboats. By an act[25] of February 6, 1817, all merchandise imported into Kentucky by the port of New Orleans was exempted from taxation during the succeeding five years. The preamble to the act declares that the prosperity of the State essentially depended upon the exportation and importation of its produce and merchandise to and from New Orleans through the channel of the Mississippi.

On the Kentucky the open channel work of 1818 was undertaken in the hope that it would further such navigation.[26]

The improvement did not attain its end nor materially affect commerce and no other work of consequence was accomplished for another twenty-five years. Small steamboats of light draught carried freight on the lower river, but until the opening of slack-water they could make only occasional trips.[A] Meanwhile, steamboat navigation on the Ohio and Mississippi made rapid progress.[B] The "circuitous trade"[C] with the east declined[27] and commerce between Pittsburg and New Orleans assumed large proportions.[28] In this the Kentucky had no part since it could not be navigated by the large, swift steamers that plied the great rivers. Its long distance traffic[D] was destroyed and

[A]James Hall, in 1848, gives the following data for steamboats which were built on the Kentucky River during this period and operated on the Ohio. (The West: Its Commerce and Navigation, Table, pp. 149-164.)

Name	Year Built	Tonnage	Date of loss.
Calhoun	1819	130	1824 (worn out)
Frankfort	1818	250	1822 (worn out)
Kentucky	1818	112	1821 (worn out)
Lexington	1825	250	1834 (worn out)
Providence	1818	450	1824(snagged above New Orleans)
Plough Boy	1824	120	

There were a number of other boats constructed (L. F. Johnson, The History of Franklin County, Frankfort, 1912), but the navigation was very desultory. The steamer "Sylph," for instance, in 1829, when in full steam attempting passage at the old ford near Frankfort, was forced to back downstream until the way was cleared of a yoke of oxen drawing a heavily loaded wagon in midstream. (The Kentucky River and its Islands, Register of Kentucky State Historical Society, No. 1, pp. 40-41.)

[B]The largest boats averaged from 200 to 400 tons burden until 1819, when a boat of 700 tons was put into commission and the time of ascent between New Orleans and Louisville was reduced to twenty days. After the opening of the Portland Canal around the Falls in 1830, the tonnage of vessels was greatly increased and by 1837 boats were ascending from New Orleans in six days time. In 1841, there were between 400 and 500 steamers of from 75 to 600 tons each in the New Orleans trade, making trips from New Orleans to Louisville in five to eight days and down in four to five days. Upstream freight was carried for fifteen cents per hundred pounds. In 1853, there were boats of 1,200 tons burden in the trade making the round trip in from twelve to fourteen days. (Collins, Vol. II, p. 361. J. S. Johnston, Memorial History of Louisville, Vol. I, p. 312.)

[C]Merchandise, which for many years had been transported over the mountains to Pittsburg from the Atlantic coast at from five to eight dollars per hundred pounds, was now shipped from Philadelphia and other eastern ports by way of New Orleans and delivered at the wharf of Cincinnati for one dollar per hundred pounds. (Hall, The West: Its Commerce and Navigation, p. 133.)

[D]Samuel Cummings, in "The Western Pilot," of 1834 (Cincinnati), referring to the Ohio and Mississippi Rivers, notes:

its unprententious craft became mere feeders to the Ohio fleet at Louisville, Cincinnati, and other accessible points.

Manufacturers, in order to avoid the rehandling of products, moved[29] from the interior to towns on the Ohio.[A] Artisan labor soon followed. The industrial pre-eminence of the central Kentucky basin became a thing of the past. The land was turned over to livestock[B] which could walk to market, and to the production of raw materials for the factories and warehouses on the Ohio. For the transportation of such traffic the State relied upon roads. Some of the highways led eastward over the

"The number of small boats have, however, rapidly diminished since the introduction of steamboats; and the singular race of men who navigated them have almost entirely been driven from these large rivers." (p. 7.) Referring to the Kentucky, the writer continues: "It is navigable for flatboats and small craft a hundred and fifty miles, and for steamboats in good stages of water as high as Frankfort." (p. 51.)

[A]Since the decade, 1820-1830, all of the large cities in the State have been located on the Ohio River. After the decline of traffic on that stream, the best railroad connections could be obtained at these points. Lexington was the metropolis until 1820, when it contained 5,279 inhabitants, and Louisville 4,012, but by 1830 its population had increased to only 6,026, while that of Louisville was 10,341. As railroad facilities have improved the population of the interior has increased more rapidly, but the population of Lexington in 1910 was only 35,099, and of Frankfort 10,465, while that of Louisville was 223,928. (U. S. Census.)

[B]The period 1815-1835 was one of depression in the tobacco industry of the United States. This was due to a restricted market after the Napoleonic Wars. The West Indies and a number of European countries became strong competitors in the foreign markets. Farmers in the Bluegrass found the raising of livestock for the southern and eastern markets more profitable, and the tobacco fields were converted into pasture land. The stock at first was driven over the transmontane roads and trails (Verhoeff, the Kentucky Mountains, pp. 98-167), and later to the Ohio River towns. As the grain belt moved westward, this industry also became unprofitable and at the close of the Civil War the cultivation of Burley tobacco which had been grown in small quantities since 1838 was substituted. "Burley is one of the most profitable crops that can be grown and were it not for the peculiar limitations of the industry it would make all the lands of Kentucky among the most valuable tillable ground of the globe. . . . The chief field for its production is, however, in the famous Bluegrass region. Here it is grown of the finest quality and on the largest scale. It has made up to the fortunate planters great depreciation in the value of horses and cattle whose breeding was such a feature in the agricultural life of the State. It can almost be said that it has saved the Bluegrass farmers from ruin. Their crops are spread over hundreds of acres and are worth small fortunes every year. No wonder pastures that have been grazed by thoroughbreds for a century have been plowed up and planted with the weed." (Johnston's Memorial History of Louisville, Vol. I, p. 253.)

mountains, others ran southward toward the cotton country. All of them terminated at the Ohio where accommodations for river shipment were easily procured. Huge canvas-covered road-wagons became active competitors of the Kentucky River boats.[10]

By the time that work was resumed on the river the Bluegrass counties had about ceased to use it for commerce. The growth of Lexington[11] and other industrial towns was checked, while, with the exception of Frankfort, the shipping points along the stream had become obscure hamlets[A] and the warehouses were in process of decay. Nearly all of the river traffic originated within the mountains where the main thoroughfares did not penetrate. In that region population and industries had increased but commodities were produced as yet in very limited quantities for market. Even there the roads diverted some of the products, and the river cargoes came principally from the vicinity of the Three Forks where the annual shipments[12] were valued at not more than one hundred thousand dollars.[B]

[A]A committee appointed by the Senate to examine an improvement at one of the shoals (see p. 24, Note A), in a report of January 5, 1825, urged the improvement of the entire river: "Kentucky has seen her granaries filled to overflowing with wheat; her boats loaded with flour; a high price awaiting its arrival at New Orleans; but no possibility of getting out of her rivers for lack of a small expenditure to render them navigable. The Eastern shipper has with unaffected mortification been seen to enjoy the rich harvest which our situation and connection with the lower country peculiarly taught was our right. From the uncertainty of interior navigation we partake but little in supplying provisions to growers of the sugar and the importers of the groceries which we consume. Were it not for the bagging and bale rope, those whom we ought naturally to feed would be our creditors, deriving their bread stuffs from the Atlantic instead of the Mississippi." (Kentucky Senate Journal, 1824-1825, pp. 379-380.) The cordage industry soon drifted to the Ohio towns but the bagging industry, probably on account of the great amount of capital invested, held its ground in central Kentucky until after the Civil War. (See p. 91, Note D.) Since then as the railroad facilities have improved there has been a tendency for the cordage manufacture to drift back to the center of the State. (Brent Moore, The Hemp Industry in Kentucky, pp. 113-114, Lexington, 1905.)

[B]The value of the exports from the vicinity of the Three Forks in 1835 was estimated at $124,000. All of this was shipped by river except about one-third of the salt, which went overland. The coal and lumber industries were

The highways, however, were merely dirt turnpikes and poor substitutes for the river. A report of the Board of Internal Improvement,[11] February, 1836, attributes a stagnation of industry throughout the river basin to the lack of adequate transportation facilities:

"In its present condition even with the most favorable tide the river affords but a precarious and hazardous navigation and in consequence nearly the whole of the transportation required by this extensive district of country is driven to the expensive and tardy result of road wagonage. Hence many articles the natural resources of the country and such as would be produced if easy and cheap communication were offered for their carriage, are either entirely neglected, or produced to a very limited extent. This is especially true in relation to the various resources presented by the mines and the forests of the mountain district, which articles are of the first necessity to the inhabitants of the older settled part of the State, but which will not bear the cost of land transportation."

That a slack-water system would restore the river to its former usefulness as a trade route and remedy such conditions was the theory upon which the project adopted at this time was based, and it has obtained until to-day. Henceforth, however, it was the mountain region instead of the Bluegrass which was looked to as the chief source of traffic. In central Kentucky salt wells had been closed because of competition with more favored fields,[A] timber was rapidly disappearing, and

only beginning to assume importance. Agriculture furnished no traffic except a few incidentals. Salt was the chief item, as shown by data compiled by the Board of Internal Improvement:

Coal, 75,000 bushels	$9,000
Salt, 250,000 bushels	100,000
Saw logs, 3,000 (number) (Poplar, Pine, Oak, Ash)	5,000
General merchandise (Ginseng, 30,000 pounds; large quantities of deer skins, furs, honey, beeswax, and feathers)	10,000
Total	$124,000

(Kentucky Senate Journal, 1835-1836, Appendix, p. 39; House Journal, 1837-1838, Appendix, p. 54.)

[A] As late as 1807 salt manufactured in central Kentucky sold for two dollars a bushel at the works. (Cuming's Sketch of a Tour, etc., Thwaites, Early Western

manufacturers[A] were beginning to depend upon the home supply of iron and coal. The Bluegrass in fact was offering an expanding market for mountain products which were bulky and naturally adapted to river carriage."

The original plan of canalization as conceived by the State Board of Internal Improvement was magnificent in scope and object. It aimed at nothing less than the connection of the Ohio-Mississippi Valley with the Atlantic by way of the Tennessee and Cumberland Rivers, and the inclusion of the Kentucky as a link in the chain by means of a canal at Goose Creek of South Fork. The system of slack-water on the Kentucky was thus,

Travels, Vol. IV, p. 165.) The chief competitor was the product of works situated near the head of navigation on the Kanawha in the vicinity of Charlestown, West Virginia, which at an early day were connected with Kentucky by a transmontane road. (Verhoeff, The Kentucky Mountains, pp. 90-95.) At these furnaces the yield of salt was one bushel from 130 gallons of brine when in Kentucky at the Blue Licks 200 gallons and at Big Bone Lick 500-600 gallons were required for the same amount. (John Melish, Travels through the United States, 1812, p. 195; Collins, Vol. II, p. 52.) After 1812 improvements at the Kanawha works reduced the price of salt, which had been one dollar and more a bushel, to thirty cents. Collins (Vol. I, p. 34) under date of February 1, 1827, notes: "Great excitement in Mason, Bracken, and Lewis Counties caused by the Kanawha salt monopoly of Armstrong Grant and Co.—a company of Maysville merchants . . . . . who contract for all the salt made at the Kanawha works and advance the price (then 30 cents) to 50 cents per bushel. Large public meetings . . . . . pass denunciatory resolutions, decline to buy or use Kanawha salt and begin arrangements for supplies of Conemaugh, Onodaga and Turk's Island salt."

In 1835 salt from all these sources was brought to Kentucky. (Kentucky House Journal, 1835-1836, Appendix, pp. 3-11.)

[A] A report to the Kentucky legislature by David Trimble, "from the Select Committee appointed to examine into and report upon the Iron and Coal trade of this State," under date of February 12, 1838 (Kentucky House Journal, 1837-1838, pp. 466-485), contains the following statement:

"No geological surveys have as yet been authorized by the State, and no scientific researches or investigations have been made by individuals. All that is known has been collected from men of business or men in search of subsistence and not from men of science. . . . The existence of coal and iron ore was known to the first settlers of the country, but at that period and for many years thereafter the inducements to explore the wilderness in search of either were not sufficient to justify the expense and loss of time; but the demand for coal and iron has increased so much and is increasing so rapidly that the necessary and proper examinations cannot be much longer delayed. Even now the people of the rich limestone lands are looking to the hills for future supplies of coal for fuel, and the iron interest is of too much importance to the community at large to be much longer forgotten or neglected."

by way of the mountain tributaries, to form part[11] of an interstate system of improved streams and canals to the coast, to be known as the "Southern Route" in distinction to the Northern or Erie Canal Route with which it was designed to compete.[A]

An outline of the waterway proposed by the State Engineer,[11] January, 1836, is of interest as schemes for its accomplishment have been agitated many times since:[B]

"The route I propose to follow would lead from the Ohio up the Kentucky River by locks and dams to the three forks of the Kentucky; thence up the South Fork and Goose Creek to the saltworks; thence by a canal into Cumberland River at Cumberland ford; thence four miles in Cumberland River to the mouth of Yellow Creek; thence by canal in the bed of Yellow Creek to Cumberland Gap; through Cumberland Gap by a tunnel and by canal from thence into Powell's River, five miles below; down that river successively into the Clinch and Tennessee, and up the Hiwassee River by locks and dams; from the Hiwassee continue the improvements by a canal to the navigable waters of the Savannah at the head of steamboat navigation on that river.

"The canal would outflank the whole chain of the Apalachian Mountains on the southwest, and in the course of its extent would cross the various noble rivers: Coosa, Chattahooche, Oconee, etc., which, taking their rise in the chain of the Apalachians flow into the Gulf of Mexico and the Atlantic Ocean between the cities of New Orleans and Charlestown. Thus throwing open to the commerce of the countries bordering on the Ohio a choice among numerous and greedy markets presented by the vast extent of cotton country along the southwestern coast of the United States; independently of the facilities it would offer for reaching the northern cities or

[A]As river commerce between the western settlements and New Orleans increased, schemes for highways, canals, and later for railroads, were adopted by the eastern states to divert traffic to Atlantic ports. The Erie Canal, opened in 1825, was successful, giving New York an advantage over Baltimore and Charleston, both of which had formerly received much of the traffic over the transmontane highways, and also by ships from New Orleans. When the Southern Canal project was proposed to the Kentucky legislature, a part of the route had been examined under the auspices of the Federal Government and pronounced feasible, and was being discussed in the legislatures of the southern states. (William Martin, Internal Improvements in Alabama, p. 38.)

[B]For a description of the canal at Goose Creek, see p. 28, Note B.

European ports through the ports of Savannah and Charlestown. . . . . It will upon reference to the accompanying estimates be seen that the average cost per mile of a lock and dam navigation upon the most perfect plan, will but little, if any, exceed one-half that of a turnpike road . . . . . More than three-fifths of the distance on the route proposed would be in the beds of rivers improved for this kind of navigation. The most perfect kind of canal can be constructed for one-half the cost of the most perfect railroad. The experience of the Northeastern States has fully settled the question that the cost of transportation on railroads exceeds that upon canals by two to three hundred per cent. . . . . .

"I am aware that the prevailing drift of public sentiment sets in the direction of railroads. Should such an improvement be determined on, the same route is open to it. If therefore an improvement of that class should be constructed through the region of country bordering on the upper waters of the Kentucky and the improvement of the Kentucky River should be discontinued at that point there appears to my mind a strong probability that the day would not be distant from the completion of such work until the demands of commerce would be equal to all the capacities of the Kentucky River improved upon the largest plan proposed. This remark applies with peculiar force to the projected railroad from Charlestown to the Ohio River now undergoing discussion in the legislature of Kentucky."

It was, however, precisely this plan for a railroad which was intended to traverse approximately the same territory, that caused the legislature to abandon the gigantic waterway project.[A]

[A]The railroad project was also an interstate scheme. The line was chartered in 1836, with a capital of six millions, as the Charleston and Cincinnati in the Carolinas, and in Kentucky as the Louisville, Cincinnati and Charleston. (Collins, Vol. I, p. 40.) The main line was to extend from Cincinnati, Ohio, southward through Lexington to the Cumberland River, and up its South Fork, and from there across the Tennessee Mountains to Knoxville, and up the French Broad River. The estimated cost of the road was $10,035,320. More than half the sum was to be expended on the northern section. (Kentucky House Journal, 1836-1837, Appendix, pp. 7, 27. *Ibid*, 1837-1838, Appendix, pp. 191-204.)

For a time great interest was manifested. A convention held at Knoxville, July 4, 1836, was attended by delegates of nine different states. August 27, 1839, a railroad festival in honor of the road was held in Lexington and many distinguished citizens from the different states were present. (Collins,

The object of the more modest improvement which the State did undertake was the connecting of the mountains with the Ohio navigation. In 1835, the Board of Internal Improvement made a detailed investigation of the quantity and value of articles brought to Louisville from other states, chiefly from Ohio, Virginia, and Pennsylvania, with a view to their displacement by shipments from the Kentucky. The report of the Board concluded:[87] "It may be safely anticipated, therefore, that the market of the city of Louisville alone can be supplied with salt, iron, coal and lumber, equal in value to a million dollars annually. These articles can be produced within our own borders, and will necessarily be transported down the Kentucky River." It was urged even before the work began that the slack-water be extended into the coal field:[88] "If stopped at any intermediate point the advantages to be derived will, of course, be diminished and might not equal the expense of its construction. If finished, the mountains of the Kentucky and the valleys of the Ohio will be brought together."

The financial failure of the works afterwards constructed, was attributed to the fact that the system had not been extended in accordance with this recommendation. It was insisted that the complete fulfillment of the project would bring about so great a development of resources within the coal field, that the downstream traffic alone would recompense the State for the extra expenditure.[89] The distribution of commerce on the stream for many years thereafter tended to prove that the Board was right in its contention.

Vol. I, p. 43.) The requirement of branches to Louisville and other Ohio River points in the original charter was a burdensome condition, which was removed in 1837, but during the general industrial and financial depression of the time the project was abandoned, to find its realization later in the Cincinnati Southern, now the Queen and Crescent Railroad. (F. H. Hollander, The Cincinnati Southern Railway, Johns Hopkins University Studies, 1894.)

The Kentucky River Navigation

With the opening of slack-water, commerce on the lower river increased for a few years. A decline[A] then set in caused by competition[40] with a system of macadam roads[B] which connected the interior towns with the Ohio. Later a railroad absorbed much of the traffic. This line, which was the the first[C]

[A]The following is a statement of the traffic which passed the locks from December, 1842, to December, 1843, inclusive:

Ascending Freight	40,290 Tons
Descending Freight	74,490 Tons
Passengers	9,625
Horses	187
Cattle	18

(Kentucky Legislative Documents, 1843-1844, p. 476.)

During the year 1847, when the maximum amount of tolls was collected (see p. 31, Note B), there were five packets in commission, each making from twenty-five to ninety-three trips. The statement of traffic for the year was as follows:

Ascending Freight	6,760 Tons
Descending Freight	13,203 Tons
Cabin Passengers (number)	21,881
Children and Deckers (number)	4,044
Livestock (number)	447
Liquor (barrels)	4,397
Lard (kegs)	5,273
Corn and wheat (sacks)	27,638
Tobacco (hogsheads)	2,141
Beef, Pork, Lard (barrels)	5,917
Dry Barrels	4,325
Wet Barrels (Salt Fish, etc.)	24,221

(Kentucky Legislative Documents, 1847-1848, p. 533.)

[B]The main thoroughfares macadamized during the period 1835-1850, were: (1) Maysville to Lexington, 64 miles; Lexington to Frankfort, 27 miles; Frankfort to Louisville, 52 miles. (2) Covington (opposite Cincinnati) to Lexington, 85 miles. (3) Louisville via Frankfort to Crab Orchard, 123 miles. (4) Louisville via Bardstown and Glasgow to the Tennessee line, 144 miles. (5) Louisville via Mouth of Salt River, Elizabethtown, Bowling Green and Franklin to Tennessee line, 145⅔ miles. (Collins, Vol. I, p. 541.) In the beginning, tolls on the Kentucky were arranged to meet highway competition, and transportation by river cost about one-half less per ton than by wagon. (Legislative Documents, 1846-1847, p. 476.) This led to a substantial reduction in the tolls of the chief competitor, the Lexington and Maysville Turnpike. (*Ibid*, p. 481.) Later, the river tolls were increased to meet necessary expenditures until they were considered confiscatory by shippers. (Kentucky Legislative Documents, 1846-1847, pp. 486-488.) The rates were especially burdensome to counties above slack-water until legislation gave them relief, as the locks interfered with downstream shipments by steamless craft. (See p. 30, Note B.)

[C]The first locomotives actually to draw trains in the United States were imported from England in 1829. Two years previously, Thomas Harlow Barlow, a Kentuckian, had built and operated a crude locomotive in Lexington, the model of which is in part preserved in the Transylvania University of that city. Collins (Vol. II, pp. 174-175) notes: "After his removal to Lexington he (Barlow) built in the winter of 1826-1827 a steam locomotive, with car attached for two passengers, and with power to ascend an elevation of eighty feet to the mile. In May,

in the State,[A] was opened December, 1835, between Frankfort and Lexington.[41] Attempts to render it a feeder to the Kentucky were unsuccessful until the completion of slack-water. The rates were less than by road but the through overland route to the Ohio was preferred because of the uncertainty of river navigation. Freight, on account of the change to wagons necessary at Frankfort, did not even take advantage of the less expensive haul between the terminals.[42] To trade on the

1827, it was opened to the public for exhibition in a large room over Jos. Bruen's machine shop, where an oval track around the room was constructed and the first 'train' in Western America put in motion. General Leslie Combs, Dr. Wm. S. Chipley, and other old citizens are still living who took a ride at fifty cents a ticket. Samuel Robb purchased the novelty for travel, visiting Louisville, Nashville, Memphis and New Orleans, at which latter place it was burned while on exhibition. In 1827, he built another locomotive and sold it to a party who found it profitable to travel and exhibit it. In 1835, another locomotive, with two upright cylinders and lever beams, both engines attached to one axle, with crooks at right angles, and upright boilers, was built by Jos. Bruen for the new railroad from Lexington to Frankfort," etc. (For Description of the Engine, see Samuel D. McCullough, My Early Reminiscences of Lexington, Kentucky.)

[A]This line of twenty-nine miles was the pioneer railroad in Kentucky but was not, as commonly supposed, the first west of the Alleghenies. (E. P. Thompson, Kentucky's First Railroad, which was the First one West of the Allegheny Mountains, Register, Kentucky State Historical Society, Frankfort, 1903.) It was antedated by the Ponchartrain Railroad of Louisiana, chartered January 20, 1830. (The Lexington Mirror, October 4, 1832, see Mrs. W. T. Lafferty, A Pioneer Railway of the West, unpublished manuscript, December, 1915, Filson Club Papers.) The Kentucky road was chartered January 27, 1830, as the Lexington and Ohio, at the instance of a number of Lexington citizens, with a capital of one million dollars, to extend from Lexington to some place on the Ohio. In 1835, it fell into the hands of the State by the foreclosure of a lien furnished the company. Later the State sold its rights to a new organization. The original road-bed was very crude. Back of Frankfort, there was an inclined plane, 4,000 feet long, with a descent of 240 feet; on the road as a whole a grade of thirty feet to the mile was common.. The single track, with sidings, was laid with flat iron rails spiked down to wooden or stone sills. The latter, extending over two-thirds of the distance were of limestone, which disintegrated upon exposure, giving the road "an undulating appearance" and "producing a continually jolting motion in the cars." In 1836, the rolling stock consisted of two engines, ten passenger cars, fifty common freight cars, and ten wood (fuel) cars. Twenty common freights were in process of construction. For the sake of economy, the engines, which had been laid up for repair, were temporarily retired. The motive power was furnished by sixty horses, which were considered sufficient, if the road was in condition, to transport daily each way, sixty to eighty tons of freight and six to eight loaded passenger cars. (Report of Chief Engineer to Board of Internal Improvement, on the Lexington and Ohio Railroad, May 2, 1837, Kentucky House Journal, 1837-1838, Appendix, pp. 181-182. A letter from the President of the Road to the Governor of Kentucky. *Ibid*, p. 364.)

slack-water, however, the railroad was an important contributor[A] until 1851, when crossing the river at Frankfort by a suspension bridge, it continued to Louisville and became a formidable competitor.[B]

After the works were abandoned by the State, an insignificant tonnage was still carried on the river between the mouth and Dam Number 3, but with this exception, commerce was confined[41] to the open stream above Frankfort.[C] There open

[A]There was probably graft connected with the State management of both the river and railroad. For a number of years the State leased the road to a company which controlled the two chief steamboats plying the stream. These boats received the bulk of the traffic from the railroad and the monopoly drove out the less favored lines. A private warehouse owned by the road increased the disadvantage of the independent boats, as lower wharfage rates were charged than at the public warehouse. (Kentucky Legislative Documents, 1846-1847, pp. 477-478.)

[B]In 1852, the toll rates on whiskey and a few other articles were reduced to enable the boats to compete with the railroad. (Kentucky Legislative Documents, 1851-1852, p. 740.) During the Civil War both the railroad and river were used for the transportation of troops and supplies. At the mouth of Hickman Creek, Jessamine County, Camp Nelson, established in 1863 by the Federals, was occupied until the close of the war. There was here a fortified circumference of ten miles, formed in part by the cliffs and hills of the river. This was the principal camp in the State for the enlistment of colored soldiers and was a refuge for run-a-way slaves. (Collins, Vol. II, p. 398.)

[C]The following is a statement of traffic for the year ending July 1, 1881. (Report Chief of Engineers, U. S. A., 1881, p. 1778, Table 2.)

	Mouth to Dam 3.	Dam 3 to Frankfort.	Frankfort to Three Forks.	Total.
EXPORTS				
Saw-logs, No.	0	0	200,000	200,000
Coal, Tons	0	0	24,000	24,000
Lumber, B. M. Feet	23,000	0	0	23,000
Tobacco, Hhds.	2,400	0	0	2,400
Grain, Bus.	2,400	0	100,000	102,400
Hides, No.	500	0	300	800
Hogs, No.	450	0	0	450
Wool, Lbs.	4,100	0	0	4,100
Hay, Bales	800	0	0	800
Misc., Tons	350	0	0	350
IMPORTS Lumber, B. M. Feet	94,990	0	0	94,990
Iron, Lbs.	74,838	0	0	74,838
Coal, Tons	2,500	0	0	2,500
Flour, Bbls.	2,500	0	500	3,000
Potatoes, Bbls.	300	0	100	400
Grain, Bus.	862	0	200,000	200,862
Salt, Bbls.	300	0	100	400
Coal Oil, Bbls.	52	0	20	72
Hay, Bales	714	0	200	914
Furniture, Pieces	1,380	0	200	1,580
Wagons, No.	6	0	5	11
Hhds., empty	2,600	0	0	2,600
Misc., Tons	868	0	20	888

channel work had stimulated traffic, which as heretofore originated chiefly in the mountains. Products were carried downstream by flatboat and raft. During high water, small steamboats ascended as far as Beattyville[A] and push-boats proceeded farther, but the keel-boats used on the main river could not navigate mountain streams even after they had been improved. Towns at railroad crossings[B] became the transshipping points and markets for the upstream counties. Frankfort, the principal railroad center, was the chief market and source of supplies, and Beattyville[C] became the distributing point for the upper valley.

Canalization of the entire stream, therefore, would probably have induced a greater traffic, for open channel work lessened only to a slight degree the dangers and difficulties of navigation which annually exacted a heavy toll[D] from commerce" and prohibited the expansion of mountain industries dependent upon the river for transportation. It was with this assumption that the Federal Government in 1880 began work upon the stream.

[A]In 1873, Collins (Vol. II, p. 462) notes: "Steamboats reach Beattyville, which is the head of navigation, with some regularity during several months of the year."

[B]A branch of the railroad between Frankfort and Louisville was opened from Lagrange to Cincinnati in 1869, crossing the river near Worthville, about eleven miles above its mouth. In 1877, the Cincinnati Southern was opened to Somerset, Pulaski County, crossing the river at Highbridge near the mouth of Dix River. (History of Kentucky by Perrin, Battle, and Kniffin, pp. 524-534.)

[C]The Chief of Engineers, U. S. A., refers to Beattyville in his annual report (1879, Vol. II, p. 1414): "Here is the Gibralter of the Kentucky Valley; all outward-bound freight must needs pass this point, and every expenditure for observation or research finds this the natural starting point. Command is had here of all products of the upper Kentucky Valley."

[D]Figures for the year 1882-1883, indicate the loss involved in the shipment of coal and forest products from Beattyville and above.

	Quantity	Market Value	%	Quantity Lost	Value
Coal, Bus.	650,000	$81,250	10	65,000	$8,125
Saw-logs (B. M. Ft.)	6,000,000	50,000	5	300,000	25,000
Ties (R. R.), No.	55,000	27,500	2	1,100	550
Total		$158,750			$33,675

(Report Chief of Engineers, U. S. A., 1883, p. 1564.)

As in the case of State improvements, the expenditure by the government for open channel work on the upper river was justified by the result. The improvement did profit the mountains, if only temporarily. In 1883 the distance downstream from Beattyville to a railroad was reduced from 160 to eighty miles when the Kentucky Central Railroad crossed the river at Ford. Steamboats ran between the two points during seasons of sufficient water, usually three or four months of the year, and push-boats took their place in the interval.[46] For 1883-1884, the value of the commerce[46] was estimated at $781,200.[A] By 1889, it had increased[47] to $2,706,732. It consisted chiefly of forest products, but coal, merchandise and produce formed a part. In 1889 a railroad tapped the stream near the junction of the Three Forks and since then, with the exception of coal which continued to be shipped for a few years,[48] forest products only have made use of the open river. The entire section above slack-water has become lined with booms erected by various lumber companies for catching logs. The booms, loose logs, and debris have almost prohibited navigation.[49]

The benefit derived by commerce from the Federal slack-water system up to the present has not been commensurate with the sums expended.

It is true the immediate effect of reopening the lower locks was to divert to the improved section quite a large trade.

[A] The commerce for 1883-1884, was itemized as follows by the U. S. Engineer:

Cross-ties (number) 75,000, $0.40 (each)	$30,000
Staves (number) 500,000, $40.00 (per M)	20,000
Sawlogs (number) 130,000, $5.00 (each)	650,000
Coal (bushels) 200,000, $0.10 (per bushel)	20,000
Country produce	10,000
Merchandise for three months	50,000
Passengers for three months	1,200
Total	$781,200

(Annual Report Chief Engineer, U. S. A., 1884, Vol. III, p. 1728.)

Merchandise and coal were carried upstream from the Ohio. Whiskey, tobacco, and other farm products were shipped downstream in quantities to markets on that river, manufacturer and farmer alike profiting by the cheap transportation. By July, 1884, two years after the opening of the four locks, the annual commerce[50] on the slack-water section was valued at $5,013,142. It increased until 1887, when it was valued at $10,798,838. The whiskey industry[A] furnished the bulk of the freight, since the grain used by the numerous distilleries at Frankfort and above, as well as the whiskey itself was shipped by river.[51]

This prosperous state of affairs lasted but a short time. The competing railroads lowered their rates, which had been almost prohibitive, and regained the traffic.[B] Two years after the opening of Lock Number 4, railroad rates between Frankfort and the Ohio were cut in half, and upon the opening of Lock Number 5 in 1886, a railroad at the head of the slack-water

[A]From the beginning the Bluegrass has been the center of the distilling industry in Kentucky. The water from the Lexington limestone is peculiarly adapted to the production of fine whiskey. "In the valleys near streams and crystal springs gushing from crevices and rents, distilleries have been planted whose product to-day stands at the head of all high grade whiskies. Whether the prime excellence and reputation of the whiskey is solely attributable to the quality of the water and its constituents, or as an able and practical distiller has argued is due mainly to the character and association of the Kentucky yeast germs, a fruitage of the locality, it is conclusive that the developments of the latter and the consequent ferments depend on the water used." In the Kentucky basin the chief plants are in Franklin, Fayette, Madison, Woodford, and Jessamine counties. Louisville has long been the distributing center for the whiskey. (Johnston, Memorial History of Louisville, Vol. I, pp. 267-268.)

[B]The reduction in rates was due chiefly to competition between Cincinnati and Louisville for the product of the Burley tobacco fields (see p. 101, Note B). The Cincinnati Southern (Queen and Crescent) in 1877 had penetrated this region and Cincinnati was becoming the tobacco center of the west. The Louisville and Nashville by reducing the rates restored Louisville temporarily to her former supremacy, and some of the tobacco continued to go to that point by way of the Kentucky. (Johnston, Memorial History of Kentucky, Vol. I, p. 253.) At present, however, the greater part of the Bluegrass product is shipped by rail to Cincinnati. The tobacco is now packed in baskets instead of in hogsheads and marketed as "loose leaf" in the warehouses which have been established at railroad centers. A small product grown on the river bottoms is transported by barge to Frankfort and other points for shipment by rail.

reduced its rates from twenty-eight to seventeen cents per one hundred pounds.[53] Between 1887 and 1890, the river commerce declined to a marked degree. The tonnage since then has been small. In 1915 it amounted[53] to 208,766 tons, valued at $2,634,328. About fifty per cent. consists of forest products floated downstream from the coal field.

It was soon realized that the slack-water system and the timber industry were mutually injurious. For a number of years the annual report of the Chief of Engineers contained the following statement: "The principal commerce on the river is timber, much of it loose logs, and the improvement is rather detrimental to this than otherwise. The logs are damaged in passing the dams, and in their turn cause much damage to the works, are a prolific source of snags, and of discouragement to any steamboat traffic that might develop."[A]

In June, 1910, the running of loose timber in the slack-water was prohibited. The process of rafting and towing logs made necessary by the order is much more expensive and has resulted in the diversion of large quantities from river to rail.[54]

Coal is next to timber in quantity of shipments. It is towed upstream from the Ohio and marketed for the most part at Frankfort and points below. Grain, tobacco, sand, and gravel are the other important items. Most of the commerce is purely local, only a small portion passing from the first to the last lock or vice versa. The rate per ton-mile varies from four mills for coal to six cents for livestock, and when carried the average distance of sixty-five miles the total cost per ton of coal is twenty-six cents, and of livestock three dollars and ninety-nine cents. For such traffic the government pays annually a liberal

[A]Where milling operations are on a large scale, this expense is not so great, as fleets of rafts can now be run and with less labor than was formerly required. The important mills, however, are now located near or within the mountains and for the small operator the open river is preferable. (See p. 200.)

subsidy. During 1915, an expenditure of $135,754 was required for the operation and maintenance of 248 miles of slack-water,[55] while the total river commerce, exclusive of forest products, amounted to 101,337 tons. For each ton carried, therefore, the government paid one dollar and twenty-six cents.[A]

The reduction of railroad rates has been one valuable result of canalization, but this in itself has not been sufficient to compensate for the large sums expended. Moreover, according to the engineer's report for 1913, railroad and river no longer compete:[56] "Of late years it is probable that the improvement has had no effect on tariff freight rates; during the early years of the improvement on the lower river it was thought to have beneficially affected the rates there. The stream reaches so many points and regions of a minor agricultural or similar industrial nature that are remote from railroads that it plays more or less a part as a supplement to or substitute for the local highway, particularly in those parts where such are notoriously bad or lacking, and it doubtless decreases the direct haulage cost

[A]The fleet at present consists principally of barges, towboats, and pleasure boats. The last, during the spring and summer, run the full length of the slack-watered section. Gasoline launches are increasing in number, towing logs and doing a general freight business between Madison, Indiana, twelve miles below the mouth of the Kentucky, and points up the river. The boats also engage in towing corn to distilleries on the river. A number of small packets of ten to one hundred tons burden ply the stream. The only one of importance operates between Frankfort and Louisville. This boat of 30 by 130 feet (draught 3.7 feet, tonnage 100) handles livestock and considerable grain, delivering wheat shipped from various landings on the river to mills at Madison. Whiskey from distilleries on the river is also transported by the packets.

River shipments of fluorspar and allied products have recently been increasing. Near Mundy's Landing, Mercer County, there is a calcite mine and on the bank of the river a crushing plant where the calcite is roasted and ground into fine rock flour used in the manufacture of paint. The plant has a capacity of twenty-five tons a day. The product is packed in 100-pound bags or 500-pound barrels and shipped by boat to the main distributing plant at Madison or to High Bridge, where it is hoisted to the railroad. The Kentucky penetrates the barites, fluorspar, zinc, and lead region of central Kentucky. In the last few years these deposits have been developed on a considerable scale. Most of the plants are back from the river, and the product is shipped by rail, but as the output increases it is probable that a greater tonnage will utilize the river. (Kentucky Geological Survey, Series IV, Vol. I, p. 63. 1913.)

in such instances by an amount not possible of even approximate ascertainment; but despite this fact, cases are known where industries on the river bank, in sections of continuously available completed improvement, haul for ten or a dozen miles to and from the railroad their regular output and supplies adapted to the water traffic available, and the use made of the improved water highway is discouraging."[A]

When the Federal Government undertook the canalization of the river, while anticipating traffic from central Kentucky it expected that the coal, iron, salt, and timber from the coal field would constitute the bulk of the tonnage. Special papers prepared for Congress by the State Geologists, Shaler[57] and Proctor,[58] urged that the cost of canalization would be justified by resultant shipments of these commodities. The Chief of Engineers[59] in 1881 noted the importance of the mountain products " . . . . from the natural resources of the country (the coal field is meant) as demonstrated in the detailed reports of Professor Shaler, the State Geologist, and other State papers, there is reasonable ground to believe that the business of the Kentucky slack-water will equal and may largely exceed that of the Monongahela, one of the greatest sources of supply to the entire Ohio Valley. These great staples (coal, forest products, and iron) are now practically inaccessible, and though railroads are slowly tending toward this region of country, yet the transportation from its nature must be mainly water transportation. It is upon this theory and for this end in view that the present improvement is based."

[A]This is true even of the region between Frankfort and the Louisville and Nashville crossing near Worthville, a stretch of fifty-five miles where there is no crossing, and where the adjacent country depends to some extent upon the river for the receipt and shipment of supplies. Between Frankfort and Irvine there are more than a half a dozen crossings and it is in this section that the availability of the river tends to lower railroad rates.

The early expectations have not been realized, and it is doubtful that the river commerce will be appreciably augmented by shipments from the coal field when the slack-water system is finished and navigation opened to Beattyville.

Since railroads have entered the mountains coal has been looked to as the only resource which could furnish any considerable river freight. When the first estimates for the improvements were revised the size of the upper locks was increased to meet the requirements of the expected coal shipments.[60] The reports of the Chief Engineer[61] have in effect stated annually: "There are not likely to be any decided changes in the volume or character of the commerce benefited until the improvement is carried to the head of the river, where it is hoped that coal lands may be developed and the product shipped by river. The development of coal lands with the resulting traffic is the specific purpose to which the expenditure will be applied."

Although coal mining in the valley of the Kentucky has expanded, the increase has been due not to the slack-water but to railroad extensions. Since 1894 the entire commercial product has been transported by rail. Slack-water when it shall have been completed can divert but a small quantity, for the deposits which will be easily accessible to it are thin and soon exhausted. As yet they have not afforded the railroads a capacity traffic.[A] The most valuable and extensive seams are at the heads of the Three Forks. Some of these could be reached by the continuation of the system above Beattyville, but the greater number are beyond the point to which it is advisable to extend canalization.[B] Besides, railroads are rapidly being built to the

[A] See p. 168.

[B] See pp. 27-28, 34. A report of the preliminary survey of the South Fork with a view to the construction of one lock and dam in that stream under date of May 1, 1915, states:

"From an engineering standpoint the improvement is wholly feasible, but from a commercial standpoint there is little in sight or in prospect to en-

more valuable deposits and there is no reason to believe that the output will be beyond their ability to handle.

Railroads did not penetrate the coal field until ten years after the slack-water project had been adopted. Since then there has been a gradual but steady advance, until the main river and North Fork are now paralleled by a line with numerous branches which follow the creeks to coal mines and timber tracts. The railroads are still chiefly of local importance, but in the near future they will become trunk lines and open up markets in all directions to the mountain products.

The Kentucky Union, the first line to reach the upper Kentucky valley, was chartered in 1854 to extend from Lexington to the Virginia border[61] by way of the Kentucky River and Pound Gap. It was not built for forty years. In 1872, a new company under the same name was organized, and between 1884 and 1886, Clay City in the Red River valley of Powell County, was connected with the Chesapeake and Ohio Railroad and thus with Lexington, by a line fourteen miles long.[A] An extension of this road up the valley of Red River,

courage further expenditure for locks and dams. No developments have occurred or are in prospect which will materially increase the commerce on the more than 250 miles of slack-water now available; in fact commerce has decreased with the increase of slack-water mileage. Although the general locality is developing and improving, its commerce is carried by the railroads and not on the rivers. The section to be benefited by a single lock and dam is rather sparsely populated, small in area, and its resources are undeveloped even in a small way. The only town adjacent is Booneville with a population of only about 600.

"There are no questions of terminal facilities, water power, or other related subjects which could be co-ordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation." (Congressional Document No. 414, 64th Congress, 1st Session.)

[A]Ten miles were completed in 1884. In September, 1885, the road and franchises, with 600,000 acres of timber and mineral land, were sold to a syndicate for $800,000, which assumed the debt ($400,000) of the old company. In November, 1886, the road was again sold to a company which also went into liquidation. The road was completed to Jackson under a receiver appointed February 1, 1891. October 13, 1891, the Lexington and Eastern Railroad Company was organized to succeed the Kentucky Union. The lands owned by the latter

between 1888 and 1890, crossed the North Fork at the mouth of Middle Fork, and continued to Elkatawa, which is a few miles from Jackson in Breathitt County.[63] July 15, 1891, Jackson, forty-seven miles up the North Fork, became the terminus of this road, which since October 13, 1894, has been known as the Lexington and Eastern. In 1912 it was extended by the Louisville and Nashville up North Fork to McRoberts in Letcher County. As soon as practicable, connection will be made with lines leading through Pine Mountain by way of Pound Gap and the Breaks of the Big Sandy and thence to the eastern seaboard. Connection with the Big Sandy system will give an outlet to the Great Lakes.[64]

With this road, July 1, 1892, Beattyville and the coal mines in its vicinity were connected by a line of seven miles from Beattyville Junction, at the mouth of Middle Fork, down the North Fork valley.[65]

The Louisville and Atlantic which reached the Kentucky at Irvine, Estill County, in 1891, was continued upstream to Miller's Creek in 1901, and the entire line from Versailles to Beattyville was completed in 1903. Since 1909 the Louisville and Atlantic has been owned by the Louisville and Nashville. Originally it was a branch of a trunk line which was chartered in 1868 to extend across the coal field by way of the Three Forks to seaboard connections in the east. The original goal will have been attained as soon as the proposed extensions to the headwaters of North Fork are finished. Another outlet to the seaboard will be secured through Cumberland Gap, since right of way has been granted for an extension from Beattyville by

company were placed in the hands of a subsidiary company, "The Kentucky Union Land Company," which guaranteed the principal and interest of the Railroad Company, the bonds of which were secured by a lien upon the entire property. (Poor: 1890, p. 456; 1892, p. 315; 1894, pp. 200-201.)

way of South Fork and its tributaries to connect with the Louisville and Nashville system[A] in the Cumberland Valley.[66]

The gradual absorption by railroads of the mountain traffic renders the slack-water system of little value. As matters stand at present the improvement represents a waste of money, labor, and engineering skill.

The Kentucky is by no means the only stream improved by the government that shows a reduced traffic.[67] In all but a few cases such streams have been unable to compete with the railroads. The cause in part has been the unrestricted power of the railroads to lower rates and to control terminals. Legislation can of course withdraw such privileges and establish a harmonious relation between rail and water transportation, which according to the United States Waterways Commission is an essential requirement for the rehabilitation of water traffic.[68] There are other advantages possessed by the railroads with which legislation cannot interfere. Among the most potent enumerated by the commission are: the wider area of distribution; the prompt and economical loading and unloading of freight; the readier transfer of traffic from one railroad to another as compared with the transfer from water to land or land to water; the greater speed per hour and the more reliable schedules.

The superiority of the railroad to the Kentucky River is enhanced by the unsatisfactory channel provided by the improvements. Each year since the opening of slack-water some of the locks have been out of commission for a part of the time. This has been due chiefly to freshets which submerge

[A] A part of this road—from the Louisville and Nashville at Barbourville, Knox County, to Manchester, Clay County—is now in process of completion. It is planned to extend the line up the Middle Fork valley into Leslie County. Clay and Leslie are at present the only mountain counties without railroads although Knott County has as yet a very small mileage.

and damage the works, and less frequently to ice.[A] In 1909, navigation was entirely suspended for 138 days,[69] and again in 1912 for forty days.[70] The lack of standardization in the size of the locks also handicaps navigation, causing delays and increasing the expense. For instance, barges of twenty-five foot beam which can pass the upper locks two at a time must go through the five lower locks singly.[71] Further, the lower works with their fixed dams are now out of date and are unnecessary impediments to downstream traffic during high water. For economical service the locks must be enlarged and the dams be provided with movable crests or replaced by structures of the movable type which have been found better adapted to the Ohio tributaries.

The greatest advantage possessed by the railroad over the river is its ability to handle through traffic at all seasons. This the boats cannot do even when slack-water permits. For a part of each year transportation is blocked by the condition of the Ohio where drought in summer, floods in winter, and other obstacles differ in degree but not in kind from those of the Kentucky. At the Falls[B] navigation is always difficult because

[A]The following extract from the report of the Chief Engineer, U. S. A., for 1916 (p. 2915), shows that the engineering difficulties are similar to those encountered by the state engineers. "The river experienced two floods, one of them very nearly equaling that of 1913 and a great many smaller rises which caused a very unusual silting up of the lock chambers and entrances. Dredging of all the locks was frequently necessary during the year to keep them in operation. . . . . on December 17, 1915, a sudden flood while the Ohio River was low caused extraordinary conditions of flow (7 feet depth of water at upper end of lock wall, the lower end dry) which tore both lower steel gate leaves from their anchorages. On February 19 and 20, 1916, it first became possible for a diver to work. . . . . No damage was done to the mitre sill or cushion sticks but the gate leaves were so badly twisted that the replacing of very many members with new steel and wood was necessary. Steel and timber were very promptly obtained and the gates were torn apart, rebuilt, and mounted so that navigation was opened on March 16, 1916."

[B]The falls are a series of rapids formed by an irregular mass of limestone underlying the entire width of the river at Louisville. This rock forms a natural dam creating a pool above and at low stages a fall of some twenty-seven feet from the head to the foot of the obstruction, a distance of about two and a half miles. At low water there are three channels, the north or Indiana chute, the

of swift current and sharp bends in the channel and is impossible during low water. Then boats are delayed by passage through the canal built around the obstruction.[A]

The Ohio also has been unable to compete with the railroads which, even before government work began on the Kentucky,

south or Kentucky chute and an intermediate passage, all of which are connected at intervals by sloughs through which torrents dash from one to the other. The exposed rocks are broad flats. In the numerous fissures weeds and willows find a footing.

At the head of the falls the Ohio is about a mile wide while below for about fifty miles its width is but half as great. During high water the contraction in the lower channel causes the lower pool to rise twice as fast as the upper until at a sixteen-foot stage upper pool the fall in the Indiana chute is reduced to about two feet between head and foot. The improvement of this passage by open channel work began in 1872, but as yet navigation for the ordinary steamer is only possible downstream at a seven-foot fall and upstream at a five-foot fall, conditions which exist for about six weeks of the year. Improvements completed in 1909 have facilitated navigation but they have not lengthened the boating season. Heavy draft coal boats can now pass in safety at stages of 11.5 in the upper river. (Report upon the Improvement of Rivers and Harbors in the Louisville, Kentucky, District, Annual Report Chief of Engineers, 1910, p. 723. A Historical Summary giving the Scope of previous projects for the Improvement of certain Rivers and Harbors, *Ibid*, 1915, Appendix, p. 1919.)

[A]Tolls were collected until 1880 when they were abolished. The canal is excavated along an abandoned channel of the river. As originally constructed by a private company chartered by the Kentucky legislature in 1825, and opened December, 1830, it was one and nine-tenths miles long and sixty-four feet wide. It contained three locks each with a width of fifty feet and a length of 200 feet and afforded a three-foot depth at extreme low water in the river. The United States became a shareholder in the corporation in 1826 and gradually increased its holding until all of the outstanding stocks and bonds came into its posession. An enlargement and extension of the canal begun in 1860 was completed in 1872, and in 1874 the Government assumed entire control of the works. The canal as improved was two and one tenth miles long and contained two additional locks of 348 feet available length with a width of eighty feet. A minimum six-foot depth was secured by a cross dam at the head of the canal. Later improvements have enlarged the works and provided a storage harbor at its head. The reconstruction of the dam across the Ohio secures a nine-foot minimum depth in the canal. This dam which was completed in 1910 consists of eleven sections of Boule's gates, Chanonine wickets, and permanent masonry separated by piers. In 1911 a contract was placed for the construction of a large lock 600 feet by 110 feet to replace the two small locks now in use and in 1913 another contract provided for widening the canal from 86.5 feet to 200 feet between perpendicular walls. An emergency dam is to be placed in the canal about 2,500 feet above the locks to stop the flow of water in case the lock gates should be out of commission. This work is now in progress. The canal is usually closed to navigation about six weeks during the year on account of high water, when steamboats use the open river. Ice occasionally prevents navigation for two or three weeks during the winter. (Annual Reports upon the Improvements of Rivers and Harbors in the Louisville, Ky., District, Annual Reports of Chief of Engineers, U. S. A. Major J. C. Oakes, Works at the Falls of the Ohio River, Louisville, Ky., Professional Memoirs, Corps of Engineers, U. S. A., etc., Vol. VI. 1914.)

had diverted much of its traffic and opened new trade routes in the south and west.[73] In fact long distance traffic on the river except for the transportation of coal has ceased and is, therefore, no longer an incentive to the improvement of its tributaries. A government report of July 9, 1909, contains the following statements:

"In its course of 967 miles between Pittsburgh, Pa., and Cairo, Ill., the Ohio River receives most of its tributaries from the south, affording transportation facilities from the rich fields of bituminous coal and the forest tracts of the Appalachian region, as well as the fertile agricultural sections of the South and Middle West. Coal and products of the forest and the farm, with a considerable movement of miscellaneous and manufactured articles, furnish the chief articles of traffic. These products are shipped largely from the smaller towns and farm landings and carried to the more populous centers for consumption or for reshipment. One of the most striking features of river traffic, however, is the absence of through lines that were formerly in operation. River commerce at present, with the exception of the traffic in coal, and to a lesser degree that in lumber, is confined principally to local movements over comparatively short routes . . . . Along the Ohio River from Pittsburgh to Cario there are forty railroad crossings or terminals from which points freight moving between interior points and points on the river system could be handled under co-ordinated rail and water service. At present, however, . . . the commerce of the rivers, aside from the movement of bituminous coal fleets on the Ohio, consists chiefly of the interchange of products between local river points, and goes but a few miles back from the river bank.[73]

"Pittsburgh is the most important river port in the United States . . . The coal that is brought down the Monongahela destined for down river shipment is moored in barges in Pittsburgh Harbor. As the coal craft are assembled and as the stage of water on the river serves, tows or fleets of about twenty-five boats, barges and flats are made up for towing down the upper Ohio River. Fleets of this size contain 350,000 to 500,000 bushels of coal, and are towed as far as Louisville where the larger fleets for the lower Mississippi are made up. Frequently in summer and autumn months when the water is shallow in the

upper Ohio, these tows cannot leave Pittsburgh, and are detained there, entailing considerable losses.[74]

"The river coal traffic at Louisville is of importance. Here the coal fleets coming down from Pittsburgh are moored at Jeffersonville, Indiana, opposite Louisville, above the Falls of the Ohio River at this point, the harbor for these craft extending as far up the river as Six Mile Island. Here the coal craft are towed through the Louisville and Portland Canal, or over the Falls. Below the Falls and Canal they are re-assembled in full sized fleets (one of the largest fleets consisting of fifty-six boats of about 1,000 tons coal capacity each) for towing to New Orleans or to be dropped off at intermediate points. This breaking up and re-assembling of coal fleets may be compared to the handling of cars at a railroad freight yard. When there is 'falls water,' that is, when there is sufficient water in the river so that boats can pass over the Falls without damage, tows are sent through without break."[75]

The government has long delayed the prosecution of improvements on the Ohio, and a lock and dam system between Pittsburgh and the mouth at Cairo, begun almost forty years ago, is still far from completion.[A] Projects have also been presented to Congress for the improvement of the Mississippi and the connection of the system with Lake Erie. The plans have been approved by engineers of ability but have not as yet been adopted as whole, chiefly because the expenditure involved is so disproportionate to the existing river commerce. On these rivers, as on the Kentucky, slack-water navigation will be subject to seasonal interruptions and the engineering difficulties are similar. Some of the recommendations, moreover, have been carried out at widely scattered points without accomplishing much good.[76] Such discouraging factors have led to

[A]The canal and dam at the Falls are part of a system of fifty-three locks and dams which when completed will provide slack-water with a minimum depth of nine feet from Pittsburg to Cairo. The dams are to be of movable type so as not to interfere with open navigation during moderate stages. The project was adopted by Congress, June 25, 1910. (R. R. Jones, The Ohio River, Document No. 537, U. S. War Department, 1915.)

the consideration of a reservoir system but the expense of this method of improvement has also been deemed prohibitive.

The opening of the Panama Canal may change the situation greatly. It makes accessible to the Mississippi River new markets on the Pacific Ocean. The result may be a largely increased commerce throughout the basin which will require both rail and river transportation. Such a result would be sufficient cause for a comprehensive improvement of the far-reaching rivers.

Until an improvement of the trunk streams shall have been effected the Kentucky in common with all other tributaries cannot function up to maximum efficiency as an artery of trade.

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CHAPTER V

MOUNTAIN TRAFFIC

In the mountains the river transportation of all products except timber has practically ceased; but until the railroad era, for at least six months of the year, the Kentucky was the only feasible trade route[A] since the roads were almost impassable during the season of rain and snow. Accordingly for a century enterprising mountaineers, in spite of constant risk and heavy loss, annually floated out their products on the spring and winter tides and relied upon the river also for return freights.

Since the beginning of settlement, therefore, the stream valleys have been the centers of economic life, and it is the mountaineers inhabiting them rather than the dwellers in the lowlands who have been most affected by river improvements.

Here as in the Bluegrass the early settlers were primarily farmers. Unfortunately for them the steep and narrow watersheds separated by the V-shaped valleys are essentially mineral

[A]The road up the Kentucky valley was the last of the transmontane routes to be improved by the State. After it became a "State Road" it was little more than a bridle path. Until a late period, all merchandise brought into the region was transported by packhorse or in canoes. (Verhoeff, The Kentucky Mountains, pp. 161-167.) Push-boats, the primitive craft used in later years for upstream carriage, still transport commodities sixty miles and more up the main streams to avoid haulage over the rough roads. Beattyville was formerly the base of supplies but since railroads have penetrated the region boats have run from the nearest crossings. Each boat carries from 10,000 to 30,000 pounds according to the stage of water and requires from three to seven men. Shoal rocks are used for landings. Rude wagons or sleds often drawn by oxen furnish drayage. These methods, expensive and unsatisfactory, are abandoned as soon as railroads are available, as recently on North Fork. They are still in use on the other forks.

The proximity of creek valley to railroad does not mean an outlet to market unless the roads are improved. The Pine Mountain Settlement, for example, located on the headwaters of Greasy Creek of Middle Fork, at the base of Pine Mountain, is but five miles (air-line) from the railroad at Harlan on the opposite side of the ridge. All freight to and from this isolated community is transported by way of Harlan over a cable road and hauled along the lower valley seven miles at a cost of seventy cents a hundred pounds. A macadamized road of six miles projected to connect the school with Harlan will cost $10,000 a mile.

and timber lands but little adapted to agriculture. That the mountains contained arable tracts,[A] however, was long known to the residents of the lowlands. At an early date settlers from the east doubtless entered the upper valley through Pound Gap and other passes following trails from the Wilderness Road and the highway in the Kanawha gorge.[1] Nevertheless, immigration in general, as shown by the Census reports, has been by way of central Kentucky. Thence, as values and rents increased, the population extended up the river bottoms.

The advance began during the decade, 1790-1800. Shortly before this, investment in mountain land had become a popular form of speculation. In 1779 the famous Virginia land law was passed. A commission was appointed to settle existing claims and arrangements were made to sell the remaining public territory in unrestricted quantities at forty cents an acre. For money paid into the Treasury land warrants were issued. In 1781, certificates issued by the State were made legal tender for the purchase of public land, the rate of exchange being a thousand in paper for one in silver. The result was to flood the Treasury with the discredited currency.[2] Merchants at home and at a distance would receive land and treasury warrants in payment for goods and after collecting a large quantity would enter extensive tracts for survey. All of central Kentucky was soon under patent so that many of the investments were made in the mountains.[B]

[A]The McAfee brothers in 1773 explored the Kentucky valley from mouth to headwaters in search of arable land. Fertile bottoms in the vicinity of the Three Forks were noted in their journals. (Woods-McAfee Memorial, p. 450.) Filson (Kentucky, Imlay, p. 288) writes in 1784: "On Kentucky River we find many fertile valleys or bottoms along the river, especially towards its rise. There is good land also on Red River, but towards the head of this and the Kentucky the soil is broken; but even here we find in valleys and along streams a great deal of fruitful land."

[B]In 1784 (February 28), an entry was made for 300,306⅔ acres of land which extended from the mouth of Contrary Creek in Lee County to Frozen Creek in Breathitt County. Twenty-two different plats were surveyed in the

As Indian attacks[A] became less frequent, land companies were formed,[B] towns were laid out, and numerous inducements were offered people in the Bluegrass to settle in the region.

same year within the boundary. Above this, the Reynolds grant of 126,140 acres was entered, based on twenty-three treasury warrants (April 22, 1784), and extending for ten miles up the North Fork. Above this entry was the Pickett and Marshall grant extending nine and a half miles further upstream. (Map showing entries and surveys, compiled from data in the Kentucky Land Office, by W. B. Dixon, Attorney, Louisville.) Data compiled from the surveyor's book of Bourbon County by R. C. Ballard Thruston, show surveys made in 1788 of plats from 75 to 20,000 acres in extent situated above the former surveys along the extreme headwaters of North Fork.

[A]Indian attacks continued for a longer period in the mountains than elsewhere in the State. (Verhoeff, The Kentucky Mountains, p. 74, Note B; p. 77, Note B.) The movement into the region was stimulated by the rapid increase in the number of slaves in central Kentucky. This rendered possible the cultivation of large plantations and antagonized the small farmer and white labor. Between 1790 and 1800 the white population of the State increased 200 per cent. and the slaves 224 per cent. At the beginning of the Civil War there were slaves in all of the mountain counties, but the number in proportion to the whites was insignificant when compared to the number in central Kentucky. (*Ibid*, pp. 26-27.)

[B]There were probably settlers from outside the State who were deceived by speculators as to the character of their holdings. The following warning to unwary investors published by Imlay (Topographical Description, etc., pp. 13-14) in 1797 is self-explanatory:

"Previous to this era (1781), great part of the valuable land in the district of Kentucky had either been taken up on old military grants and pre-emption rights or located by those who had been first in obtaining their warrants; for it required some time for the business to extend itself and become generally known and understood. In consequence a large proportion of holders of treasury warrants were disappointed when they determined if they could not obtain prime land they would lay their warrants upon such as was vacant, however sterile, which doubtless was proper; for though the warrants had cost them only a nominal value nor was the State of Virginia sensible of the dangerous avenue they were opening to fraudulent practices, yet it was possible in an extensive tract of mountainous country there might be in the valleys or between the hills some bottom land which in the progress of settlements would be of value. But they did not stop here; for finding that a general spirit of migration was taking place from every part of the Atlantic to the Western country, and that the reputation of the fine lands upon the Ohio, particularly those of Kentucky, were every day advancing in estimation, they determined to have their surveys made out in the most artful manner by having for corner trees such kinds as are never known to grow but in the most fertile soil and which may always be found on the narrow strips of bottom land, and the plots embellished with greatest elegance, displaying fine water courses, mill seats (where perhaps there will not be a grain of corn for half a century to come), plains, groves, and meadows.

"Hence proceeded so generally the business of land jobbing—hence it is that there is to be seen in the Mercuries throughout Europe such immense tracts of land in America offered for sale—and hence it is that so many persons have cause to complain of having been deceived in the accounts which have been given of land they have purchased. I had given such an account in this work of the good and indifferent veins of land which I had believed would have directed every purchaser of such land against the danger of imposition," etc.

Russell's Map of Kentucky, under date of 1794, gives two towns in the vicinity of the Three Forks—Franklinville at the mouth of Middle Fork and Somerset on the main river mid-way between South Fork and Red River.[A] The Kentucky Gazette of May 9, 1798, contains the following advertisement which indicates the methods pursued by the proprietors of land[B] to dispose of their holdings:

Martinsburg, a town lately laid out in a large bottom lying on the Kentucky River and on the north side thereof supposed about twenty miles above the Three Forks and to contain 500 acres of land. The town is laid off on a square and the lands adjoining will admit of an extensive settlement. The ten first settlers will be entitled to one lot each, gratis.

[A]See map opposite p. 82.

[B]It is possible that before 1790 there were temporary settlements in the region. A number of surveys made on the North Fork in 1788 (see Note B, p. 130), were based on pre-emption land warrants which meant that before the enactment of the Virginia law (1779), the original claimant had occupied the land or had "built a house or hut or made other improvements thereon." (Hening, Vol. X, pp. 31-50.) There were towns laid out and settlements established in other parts of eastern Kentucky about 1788, although Indian hostility interfered seriously. (Verhoeff, The Kentucky Mountains, pp. 74-75), Charles Vancouver, a merchant of Providence, near Lexington, who built a block-house at the forks of the Big Sandy offered even more liberal terms to settlers from the Bluegrass than the proprietor of Martinsburg. He owned two surveys of fifteen and eight thousand acres, and under date of September 27, 1788, advertised that he would make over in fee simple to twenty of the first families who would positively settle on his land, fifty acres each, to be located on the north and south branches of the Big Sandy at least two miles distant from the main river, and half a mile from each other. He proposed laying off a town at the forks and would give in fee simple to each family a town lot of one acre. He would set out October 20, with a party to view the land and select the most eligible site for a town. (Kentucky Gazette, October 18, 1788.) The following year (*Ibid*, February 7, 1789), under date of January 1, Vancouver announces to those desiring to settle "at the aforesaid place," that he has been detained on account of necessary preparations, and that a party will set out February 10 from Strode's Station, near Winchester, Clark County, to erect a block-house and to establish a ferry where the new road crossed at the main forks of Big Sandy. He would build cabins at the necessary stations or resting places along the road which he presumed would prove a great convenience for travelers. (See Verhoeff, The Kentucky Mountains, p. 95.) In addition to inducements already held out to settlers he would give an "in-lot" and an "out-lot" of the town to each of the twenty families. To the first ten families who positively settled on the lands he would resign the benefit of the ferry for two years. He also promised to purchase on the spot at the market price with goods and cash all the fur, peltry, and ginseng which the settlers could procure, and would pay them very liberally for any improvements which they would make upon his lands. At the same time, a large company would start from Strode's Station bound for the settlement at the Forks of the Sandy.

The lots appropriated for that purpose are known in the plan of the town by their numbers 3, 8, 15, 19, 24, 28, 34, 38, 41, and 49. A sale of lots in said town will be held at Mount Sterling in Montgomery County on November court day, also at Clarke Court in the same month by way of public auction. The subscribers have also for sale adjoining said town three or four thousand acres of land on moderate terms.

John Murphy.

May 3, 1798.

N. B. Proclamation of the time of settling the town of Martinsburg will be made at the time of selling the lots. J. M.

In 1800 there were from two to six inhabitants to the square mile along the main river and for a considerable distance up the Three Forks. Within the next two decades a steady movement towards headwaters took place and in 1820 settlements were scattered throughout the basin.[1] Since that time population has gradually increased until in 1910 the inhabitants[4] numbered 122,529.[A]

The majority of the people still live on farms. The only towns, with a few exceptions, are the county seats. Jackson in Breathitt with 1,346 inhabitants, and Beattyville[B] in Lee with 1,360, are the most important. The remainder have populations of between 300 and 600.[C]

[A]The Bluegrass counties contiguous to the river in 1910 contained 228,105 inhabitants so that the mountain population made up thirty-five per cent. of the total within the river basin (U. S. Census), and twenty-three per cent. of the population within the entire eastern coal field. (See Appendix, Table I, page 211, and also Verhoeff, The Kentucky Mountains, pp. 24-26.)

[B]It is said that the first settlement in Beattyville was made by Samuel Beatty in 1842. This town of 123 inhabitants, in 1870, became the county seat of Lee upon the formation of the county in that year. The first court was held in Proctor on the opposite side of the river which in 1870 had a population of 100. (U. S. Census.)

[C]The figures are for 1910. Since that year, the development of the coal at the headwaters of North Fork (see p. 181) has brought about an increase in population. Hazard, in Perry County, for example, with a population of 537 in 1910, is now credited by the Commercial Club of that town with 4,000 inhabitants. Many of these, however, are miners and their families and other employees of the mines in the vicinity who come and go as the works are opened and closed.

Agriculture although the chief industry has afforded a scant surplus. To add to the meager income derived from the farm the mountain men have attempted to develop the salt, iron, coal, and timber. It is these resources[A] that have

[A]An advertisement in the Frankfort Palladium shows that these resources as well as agricultural land were incentives to immigration, and is interesting as a description of the valley in the vicinity of Beattyville. William Leavy, a Lexington merchant, under date of December 4, 1805, offered for sale 18,000 acres of land "on the left-hand side of the Three Forks as you go up the Kentucky and at their junction; running along the river three miles and nine miles back."

"The bottoms are rich land; the ridges are capable of producing wheat and other small grain. The pasturage is excellent for raising stock of all kinds, as it has plenty of cane brakes and vines. All along the river is the sugar tree, wild cherry, and other woods common to this country. When you go back some distance is the pine, which produces tar, turpentine, pitch, and rosin, which will finally be valuable, independent of the wood that is upon the land.

"There is also a rock close to the low water mark, that when the water is very low shows clear salt upon its surface, and the rock itself tastes salt. There has been three water witches (as they call them) trying the experiment; they say there is four feet square of very salt water at the top of the bank, which is not a hundred feet from the water; and close to it a very easy ascending hill for several miles; and also the wood along the river.

"A coal bank is within three hundred yards. There are also five valuable coal banks near the river with easy access to them. Also a coal yard and boat yard; and it is said several saltpetre caves. The bottoms and along the creek would produce good cotton and hemp. Lexington alone, independent of the country blacksmiths, consumes thirteen thousand (13,000) bushels (of coal) per annum, and we will suppose Frankfort uses five thousand (5,000) bushels, which sells at the landing at one shilling per bushel; twenty thousand (20,000) bushels might be sold; this might be made productive by a man of small capital.

"Independent of these advantages, the mouth of the three forks is the best fishing place in the State. In a small crib they can get five hundred pounds of fish in a day and may get by a seine five or seven hundred barrels per annum.

"Tobacco, flour, beef, pork, tallow, hog's lard, hemp, cordage, whisky, or cast iron will be taken in payment for the land.

"N. B. There are a number of acres of clear bottom land and several log houses upon the above land." (Quoted in Collins, Vol. II, p. 408.)

The pine forests of eastern Kentucky were at this time exploited for tar used in the manufacture of cordage in the Bluegrass. Cuming (Tour to the West, Thwaites, Vol. IV, p. 186) says that in 1807 tar manufactured on the banks of the Big Sandy sold in Lexington at eighteen to twenty-five cents a gallon. Saltpetre was also shipped from the mountains at an early day. Here ledges of the Lee Conglomerate often overhang their bases forming grottoes (rock-houses). On the floors are deposits of sandy grains and nitrous particles which accumulate as the Conglomerate containing nitrate of lime crumbles away. Nitrate of Potassa (saltpetre) was obtained by leaching the ley from these earths through wood ashes and sent to the Bluegrass where by the addition of sulphur brought from Philadelphia it was manufactured into gunpowder and shipped to "Upper Carolina and Low Louisiana." (Michaux, Travels, Thwaites, Vol. III, p. 202.) The nitrous deposits are more extensive in caves of the Subcarboniferous (Newman) limestone, and of less value in the rock-houses of the Upper Coal Measures. (Mather's Report, Kentucky House Journal, 1838-1839, pp. 265-266.) During the War of 1812 large quantities of saltpetre were manufactured in the mountains. (Collins, Vol. II, p. 691.)

attracted outside capitalists and which have contributed in quantity to commerce. An historical survey of the origin and development of this traffic shows, that while canalization of the Kentucky by the Federal Government has been useless, the failure of the State to execute its project retarded the economic progress of the mountain people.

AGRICULTURAL PRODUCTS

The topographical distribution of soils in the region differentiates the farming area into bottom and ridge land. Bottoms border all of the streams but are most extensive along the main river and the Three Forks. The amount in any locality is very limited and yet the total acreage is considerable because of the network of creeks and branches which traverse the region. There are usually two tiers of bottoms. Those immediately bordering the streams are subject to overflow, while the well-defined terraces between the lower levels and adjoining hillsides are not submerged except by unusual floods. The soil of both is alluvial and very fertile although clay, sand, and rock fragments cause great variation within short distances. Enriched annually by the overflow, the fertility of the lower land is not impaired by years of cultivation, while on the upper tracts improper methods of agriculture soon injure the tilth and greatly reduce the organic matter.

On the ridges the soil, which for the most part is derived from the underlying rocks, is held in place chiefly by the plant roots of the forest. Geological conditions determine its distribution. The generally horizontal position of the strata renders the surface rock of the greater part of the region exposed to the slope of the hillsides at such an angle that the detritus slowly accumulates. Even upon the uplands, therefore, there is usually a deep soil. In contrast are the occasional areas of faulted

and tilted rocks of which Pine Mountain is the only conspicuous example. There, where the dip nearly coincides with the slope of the ridge, rain and snow keep the soil washed down almost to the rocks.

The sandy loam which thus covers the ridges varies in chemical composition with the source of the waste but the virgin soils are all fertile because of vegetable mould supplied by the forest. The hills where lower and round in contour, can be cultivated from foot to crest, but in general the slopes are so steep that the farms are located on benches or terraces which occur at various levels. The upper slopes are least fertile as water percolating through the soils continually leaches and impoverishes them, but along the lower slopes the washings of the fine rich material from the uplands accumulate and the terraces rank next to the bottoms in fertility.[6]

Until recently the utilization of the land has been selective. Since the bottoms were most accessible and also most productive, the settlers cleared them first and followed them in all directions into the interior.[7] In the lower counties the fertile limestone terraces of the coal field scarp[A] were occupied at an early date[8] while further upstream the farms were confined to the bottoms and lower slopes of the high hills. Gradually, as the supply of favorable sites diminished, less and less desirable tracts were cultivated until during the last two decades all available land, including precipitous hillside and narrow crest, has been rigorously farmed.[9]

[A]The Kentucky Geological Survey, of 1855 (Old Series, Vol. IV, p. 472), referring to Estill County which then included Powell County, notes: "Hardwick Creek flows for more than half its length through a broad valley cut out of the Knob formation. Its sides are flanked with terraces of limestones which give eight to ten barrels of corn and ten to twelve bushels of wheat to the acre. For a mountain district it is thickly settled and much attention has been paid to the culture of Chinese sugar cane.

"The lower portion of the valleys of Millers, Cow, and Station Camp Creeks present the same advantages and are also thickly settled." (See Verhoeff, The Kentucky Mountains, pp. 14-20.)

The land for the most part was acquired originally either by purchase at a low price or by gift of State or county for public services such as labor on the highways[10] or river, and has been bequeathed by one generation to the next. Many holdings are covered by blanket surveys including vast tracts granted at an early day by Virginia or Kentucky and which are now owned by outsiders. There were but few attempts to make good such claims until railroads entered the region. Since then the development of coal and timber has rendered clear titles necessary and lawsuits among various claimants have been frequent.[A] In some of the upper counties tracts have been acquired by different companies and consolidated into large holdings of 50,000 acres and more in extent. Where the land has been purchased outright it is resold to settlers after the exhaustion of its coal and timber. In most cases, however, the mineral rights,

[A]The imperfect land system of Virginia was adopted by Kentucky and left a train of insecure titles which have interfered seriously with the development of mountain resources. The State made no preliminary survey of land before it was transferred to settlers. Each possessor of a land warrant was allowed to locate the same where he pleased and was required to have his own survey made and to designate the boundaries thereon so accurately that each subsequent locator would make entry elsewhere. The surveyors as a rule were more skilled in woodcraft than in legal requirements. The boundaries, moreover, were usually vague, the location calls consisting of water courses, traces, licks, trees, and other natural objects. There was little or no limitation of size to surveys and they were of all areas and shapes. "The poor man was content with his patch of one hundred acres; the speculative capitalist of the day would perhaps 'run out' a hundred thousand acres or more. In time half a dozen patents would be laid over the same land. Areas of unpatented land of all shapes and sizes lay between the patents. As land grew dearer the would-be 'blanket' patents were put over extensive districts in the hope of capturing these unappropriated lots. Of all these conflicts the Virginia and following it the Kentucky land office took no note . . . . . The State only guarantees the entry if the land is unpossessed under previous titles of valid kind. In time a vast amount of litigation and no end of trouble came out of this scheme. At this moment owing to the absence of records there are hundreds of thousands of acres in Kentucky over which no sort of ownership has ever been exercised. No taxes are collected on them. If they have ever been surveyed no one knows under what patent they are claimed." (Shaler, History of Kentucky, pp. 50-51. 1885.)

In the mountains the isolation and sparse population delayed the day of reckoning and many unfortunate and dispossessed claimants from the Bluegrass found refuge here occupying in many cases patented but unoccupied land. The statute of limitations has now remedied many evil results of the system but confirmation of titles by the court is still necessary and often leads to unexpected and expensive litigation.

and less frequently the timber, are sold separate from the land.[11]

Until after the Civil War the region was one of small farms, in contrast to central Kentucky where the large plantation based on slave labor predominated. The boundaries, confined for the most part to the bottoms, included long narrow strips between two bends of a stream.[12] Few farms contained 1,000 acres or more. During the decade 1870-1880 the devastations of war made necessary the enlargement of the size of the farm but since then there has been a gradual decrease.[13] In 1910 the average farm varied from 126 acres in Leslie County to seventy acres in Lee.[14]

All crops commonly found in Kentucky are produced on the mountain farms but the average return per acre is usually about one-half that of the State as a whole. Corn is the principal product, occupying at least three fourths of the tilled land.[A]

[A]The greater portion of the corn is ground into meal for household use. A small portion is fed to livestock and the remainder is converted into whiskey. Since the passage of the County Unit bill, a number of communities have adopted prohibition. Prospering with the downfall of legitimate competition, however, the illicit still as yet flourishes in the remote gorges. There is a public sentiment against the consumption of this beverage but the distillers are exonerated on economic grounds. Corn in the fall brings fifty cents a bushel while two bushels and a half manufactured into "moonshine" retails for four or five dollars. Revenue officers find a fight against a rising market difficult.

The methods used for grinding corn into meal are very crude. When possible the grain is taken to the small custom grist-mills built at the shoals of the streams. The mill-race, about twenty feet long, is cut into the rock bottom of the stream and the mill is merely an uncovered frame work supporting the overshot or undershot wheel and millstones. A daily output of from twenty to sixty bushels is the maximum for such establishments. In many homes the hand-mill is still used. A state report of 1885 describes a "pounding mill" in operation in Clay County at that time: "This grist mill is probably the last of its kind in the State, the hand-mills and home-made four-bladed turbines cut from solid wooden blocks and now in common use having generally superseded them. The mill consists essentially of a mortar and pestle; the mortar, a short section of a tree, in one end of which a hole is scooped out for the reception of grain; the pestle a straight stick about four feet long, attached to one end of a lever supported in the middle. A weight is hung with the pestle in order to balance the opposite end of the lever which end has cut in it a hollow place with a capacity of about half a barrel. Water is led to this trough from the rapidly falling stream by a conduit some 100 feet long made of the bark of trees five or six inches in diameter. When the trough is filled with water the added weight

Some of the bottoms after a century of cultivation continue to yield fifty bushels and more to the acre but as a large proportion of the crop is now grown[A] on the hillsides, the average yield per acre in a county varies from seventeen bushels in Letcher to twenty-six in Estill.[15]

The yield and acreage of other cereals are much less. Oats ranks next to corn and is used as feed for cattle.[B] It is grown widely but in decreasing quantities. Formerly wheat ranked second to corn. It has been declining in importance in the last two decades and in some counties its cultivation has entirely ceased.[C] Rye has been found excellent as a cover crop to protect sloping fields from winter erosion. It also affords good grazing early in the spring when there is little other pasturage and in consequence is produced very generally though in small amounts. Buckwheat is planted only occasionally as it soon exhausts the soil.[16]

causes it to descend until its inclination is sufficient for most of the water to run out. The greatest weight being then on the other end the pestle falls and lifts the trough into position to be refilled. This see-saw motion continued, it is said, will crush into very nice meal a half bushel of corn left over night in the mortar; and also any stray field-mice or other hungry small animal which may venture into the mortar left open and unprotected in the forest." (Report Kentucky Inspector of Mines, 1901-1902, Chapter XV, p. 113.)

[A]To prepare the ground for planting the primitive "bull-tongued" plow is driven around the hillside to the top, and the same implement is used for furrowing. In three or four weeks after the spring planting the corn is ready for the first "working" and the plow is again used. The crop is generally "laid by" about July tenth after two or three workings and is garnered the middle of September. The corn is usually cut with a hand-knife and carried in the arms to the shock. Later in the winter the entire household engages in shucking and hauling the corn to the barn in sleds, as wagons cannot be used on the steep slopes. On some farms as soon as the grain hardens the leaves are pulled back and the stalks are tied in bundles for fodder while the corn is shucked later. This process of "blading and topping" provides excellent food for cattle but it is costly as the corn crop is injured perhaps eighteen per cent. of the value and the labor required is so great that children must stop school to assist in the work.

[B]On the most fertile bottoms thirty to fifty bushels of oats can be produced but the average yields in the counties vary from six bushels per acre (Wolfe and Lee) to eleven and a half bushels (Estill). The average for the State is thirteen and six-tenths bushels per acre. (U. S. Census.)

[C]The more fertile bottoms have yielded twenty to fifty bushels of wheat per acre but the average yield per acre at present varies from five (Knott) to nine bushels (Powell) excepting that of Breathitt where from five acres in 1909, the yield was fourteen bushels per acre. (*Ibid.*)

Tobacco, the most lucrative crop in the State, is grown in small patches on each farm.[17] The inferior black variety is more common than the valuable Burley since it does not require so fertile a soil.[A]

Sorghum or Chinese sugar cane is cultivated in all the counties[18] chiefly for the molasses made from it; the seed is fed to stock and poultry.[B] Cotton, flax, and hemp were formerly found on most farms but are seen now only in a few remote valleys where the housewife still spins and weaves them into cloth. Each homestead has a vegetable garden, potatoes and beans[19] ranking first in yield and acreage.[C]

None of these staples have been produced in quantities more than sufficient for the home demand. The only important shipments from the farms have consisted of livestock.

At an early day cattle and hogs were driven across the mountains into Georgia and Alabama[20] and later sheep and cattle to Lexington and other markets in the Bluegrass.[21] At present practically all shipments are by rail. Only cattle,[D] mules, and sheep[E] are sold; swine and horses are kept for home

[A]The average yield of tobacco per acre is very low, varying from 204 pounds (Perry) to 793 pounds (Estill). The Bluegrass counties average over 1,200 pounds per acre. (*Ibid.*)

[B]One acre of sorghum furnishes about eighty gallons of molasses known as "long sweetening." The cane is cut before it is fully ripe when the juice is most copious and this gives the molasses its characteristic taste. The juice is extracted by rough mills and contains elements which prevent the making of sugar.

[C]The average yield per acre of Irish potatoes in Estill (100.9 bushels) and Owsley (104.1 bushels) is greater than the average for the State (91.8 bushels), but in the other counties it is less, varying from 60.4 bushels (Breathitt) to 90.3 bushels (Powell). The beans are dried for winter use and form one of the chief articles of diet. The production of vegetables is increasing, especially in the vicinity of railroad towns and mining and lumbering centers where the bottoms are often converted into truck gardens. (U. S. Census.)

[D]Dairy products are produced on the majority of farms for home use and small quantities of milk and butter are sold to neighbors or peddled in the towns. Cheese was formerly made in small quantities but now is seldom found. (*Ibid.*)

[E]Sheep are clipped twice a year and the wool which was formerly used for home manufacture is now shipped to manufacturing plants in Knoxville, Tennessee, and other industrial centers whose agents meet the farmers in the larger towns. The wool is returned as blankets and other commodities which before the railroad era were manufactured by the housewife.

use. Within the last two decades the receipts from the sale of live animals has everywhere increased, and in some of the counties there has been a gain of over one hundred per cent.[22]

Poultry raising is common though left entirely to the women. Chickens are kept for home consumption but goose feathers have always been shipped, at first by river and now by rail. In the vicinity of railroads turkeys are supplied for the eastern markets.

A few by-products of the farm have also been marketed. Orchards of apples, pears, and peaches have provided a considerable surplus, the value of which is increasing. Apples[A] are the surest crop and in the best orchards the trees are thrifty and of good size. The yield in some of the counties is more abundant than elsewhere in the State.[23] The greater part of the crop is sun dried, the rest is made into vinegar and cider. Blackberries, huckleberries, and other small fruits grow wild in the forest. Their cultivation has been stimulated lately by State canneries which have been started in the region.

The shipment of many commercial products is ceasing with the disappearance of the forest upon which they depend.[24] Honey and wax are still sent out from the upper counties where maple and linden trees furnish the bees with forage, but in the lower counties where these trees have been cut out hives are found only on a few prosperous farms. Wild game[B] driven from

[A]The average yield of apples per tree in Wolfe County in 1909 was seven-tenths of a bushel, which is less than the average for the state (1.3 bushels), but the yield in other counties varied from one and two-tenths (Perry) to three and seven-tenths bushels (Letcher). (U. S. Census.)

[B]The deer, red fox, and wolf are still occasionally found. The most valuable animals at present are the mink, wild-cat (Canadian lynx), and raccoon. The skins are shipped by local merchants to Louisville, St. Louis, and other cities and from there to Europe. (See p. 47, Note A; p. 183, Note A.) In 1793 and probably earlier, skins and furs from the vicinity of the Three Forks were taken to the Bluegrass for manufacture into hats. (Collins, Vol. II, p. 614.) In 1807 there were in Lexington five establishments producing thirty thousand dollars worth of hats annually. (Cuming's Tour to the West, Thwaites, Vol. IV, p. 186.) Before

central Kentucky by the settlements found a retreat in the mountains and until recently has supplied furs and skins for market. Roots and herbs[A] which now must be sought for in remote gorges were at one time an important source of revenue to the farmer, and even yet are shipped in some quantity.

None of the agricultural products are shipped by individual farmers. Instead, they are taken to the nearest store and when a sufficient amount has accumulated they are sent out in wholesale lots and now by rail.[B] Formerly they made up a considerable part of the river cargoes.[C]

the embargo shut off exportation, large quantities of bearskins collected by hunters in various parts of eastern Kentucky, valued at four and five dollars each, were sent to Europe for manufacture into caps for soldiers. (Collins, Vol. II, p. 459.)

[A]Golden seal (yellow root), pink root, seneca and snake root rank next to wild ginger and ginseng which are the chief products. Ginseng (*Panax quinquefolius*) has been shipped in large quantities since the first settlement of the region and like the skins of animals has served as a medium of exchange. A skilled "sang digger" can now make two dollars a day and occasionally a single bunch of fifteen pounds or more nets this amount to the finder. He roams the woods "armed with a light spade made like a chisel, a couple of inches wide and with a round handle about three feet long or carries a small eye-hoe made for the purpose. Other tools lacking he uses a sharpened stick and in a pinch digs up the roots with his fingers or jack-knife. He carries at his side to hold the roots a simple home-made cloth or linoleum satchel shaped like those used by school children for books." The roots are strung on twine or thread and hung to the walls and rafters of the cabins to dry. (H. Garmen, Ginseng, its Nature and Culture, Kentucky Agricultural Station, Bulletin 78.) Michaux, referring to the ginseng trade of Kentucky in 1802, says that a man could not pull above eight or nine pounds per day. It was gathered in the spring and until the end of autumn. Merchants purchased dried ginseng at ten cents per pound and sold it at from eighteen pence to two shillings at the seaports. The trade had been brisk within the preceding four or five years as the process used by the Chinese to render the root transparent had become known. A description of this process, although published in books, had been sold in Kentucky for $400. After preparation the product was sold to merchants in Philadelphia for six or seven dollars per pound and resold at Canton for fifty or a hundred dollars according to quality. Some of it was shipped directly to China from Kentucky. (Michaux, Travels, Thwaites, Vol. III, p. 233.)

[B]Much of the local trade has been carried on by the women. The State Commissioner of Agriculture in 1787 (Annual Report) called attention to this fact in a description of each mountain county. Referring to Perry County, his report states: "This section of the State is sadly in want of transportation facilities, so much so indeed that the people are discouraged from engaging extensively in any branch of agricultural industry. . . . There are but few manufactures in this county, except what are conducted by the economical, intelligent,

[C]See p. 143.

Mountain Traffic

The amount of capital invested in agriculture has always been small and the farming operations have been petty.[15] At present the average investment per farm[A] in most of the counties is about one-third the average for the State. Over fifty per cent. is in land, the value of which has in many cases doubled in the last decade. The remainder is in buildings, usually a primitive house and barn, in livestock, and in implements most of which are exceedingly crude.

The farmer took with him into the mountains a careless system of tillage characteristic of pioneer Kentucky, which he has maintained to the present day.

industrious women who keep up the good old fashion which they learned from their mothers and grandmothers, of using the flax-wheel and distaff, the cotton and wool-cards, the wheel, the warping-bars and the hand-loom. Every girl is taught how to make the cross and beam the warp, to use the treadle and ply the shuttle and to excel in making linsey, jeans, cottonades, linen, counterpanes, and huckaback towels and bed-spreads. After supplying the family with these articles the good ladies traffic the surplus as well as large amounts of beeswax, butter, eggs, poultry, feathers, home-knit socks, dried fruit, maple sugar, tree molasses, and ginseng to the country merchants in exchange for 'store goods,' 'spun truck,' fancy dresses, ribbons, jaunty hats, hoop-skirts, groceries and whatever other articles may be essential for their comfort and Sunday apparel."

[C]See p. 102, Note B. As early as 1840 there were sixteen merchandise firms in the region representing a total capital of $18,800. (Sixth Census, U. S.) Company stores connected with coal and timber industries and agents from outside wholesale firms now compete with the country stores. Surplus products are brought in small lots by the farmers who receive in exchange groceries, clothing, and other merchandise. Practically all food-stuff is resold to the farmer at an advanced rate during the spring and early summer when his fall supply of meat and corn is exhausted and vegetables have not matured. There is then a general scarcity of food and on the poorer farms high prices at the stores cause actual suffering. A bushel of corn sold at fifty cents by the farmer immediately after the harvest is bought back during the spring planting at a dollar or more. Merchants derive a part of their income from mortgages and some have amassed considerable fortunes. During unfavorable seasons when the corn crop is short even prosperous citizens become indebted. Often for a supply of groceries the coming crop as well as the personal effects of a farmer are mortgaged subject to call within a short period. The price of goods is not stated in the contract, the merchant charging what he pleases. The short contracts necessitate constant renewals, and in many cases confiscation of property. This form of indebtedness is increasing although as yet, the majority of farms operated by the owner—eighty-one to ninety-six per cent.—are free from mortgage. Banks, which have come with the railroads, by doing away with the system of barter, are lessening the opportunity for usurious methods.

[A]The average investment per farm in Powell County in 1910 was $2,375, which was almost equal to the average for the State. In all other counties it was much less, varying from $867 in Lee to $1,389 in Estill. (U. S. Census.)

The land is prepared for cultivation by clearing it of trees which are felled or killed by removing the bark and sapwood in a circular band, the Indian method of girdling, and allowed to stand until they fall of themselves. The best timber is removed for home use or market, the remainder is burned with the scattered underbrush and refuse. The field is generally left full of stumps and stones which interfere seriously with the plough.

Once under cultivation the land is worked without fertilizer or rotation of crops until exhausted when it is allowed to "rest." As a rule the bottoms lie fallow every third year at the end of which exploitation is renewed. On the more fertile tracts such cycles have been repeated for years, sometimes for a century, with little decrease in yield. On the ridges when the returns decline the field is abandoned and a new strip cleared. This is usually necessary after from five to ten years constant use but many clearings bear not more than two or three crops before they are deserted. Often trees spring up on the lower slopes and occasionally on the crests and the soil is renewed. Such tracts known as brush lands are again cultivated for a short period and then given over permanently to the ravages of stock which browse on the weeds and briars. The greater part of a farmer's holding, therefore, consists of these exhausted plots or of woodland.

Such a wasteful system of agriculture cannot continue indefinitely. The conditions under which it was possible are rapidly changing. Formerly, when there was land in plenty it was a trivial matter to abandon an exhausted farm. Now, the scarcity and increased price of land available for tillage as well as the defining of property rights render the acquisition of a new holding much more difficult if not impossible. Moreover, most of the work must now be accomplished by the farmer himself with the assistance of his family. Hired labor always difficult

to obtain has become exceedingly scarce because of the higher wage offered by the lumber mills and coal mines. On the majority of the farms, from fifty-nine to eighty-two per cent., no outside labor is employed. The farmer is compelled therefore to make the best of what he has by more intensive methods.[A] As evidence of the change there can be noted not only a decrease in the size of farms, but also a greater proportional increase in the number of farms than in the total acreage included in them.[B] An increase in the proportion of improved land to total area in farms[C] is likewise significant, as is also a more generous expenditure[26] for machinery,[D] implements, and fertilizer.[E]

In the livestock industry also, new methods must be employed in the future. In the past, stock has been turned into the forest to roam at will for at least ten months of the year drinking

[A]As yet the greater number of farms—fifty to seventy-two per cent.—are operated by the owners, but the tenant system has been increasing rapidly in recent years and seriously hinders the adoption of improved methods. The leases are short and the rent is generally paid in produce so that there is every incentive to work the land recklessly for immediate results. The usual plan is for the tenant to pay from one-third to one-half the farm output, furnishing everything necessary to produce the crop except the fertilizer. The tenant is sometimes granted the privilege of pasture land in addition to the tract cultivated. Where cash is exacted, the payment ranges from fifty cents to five dollars an acre. On the poorer farm, the tenant retains his scanty crop and pays his rent, by logging, clearing ground, peeling bark or in other work for the owner.

[B]Between 1900 and 1910, there was an increase in the number of farms in all counties excepting Lee, where there was a slight decrease. The total acreage in farms decreased in five counties (Clay, Lee, Leslie, Letcher, Wolfe) and in the other counties the gain was very slight. (U. S. Census.)

[C]In 1900 the proportion of improved farm land to the total area in farms varied from twenty-one and one-tenth per cent. (Knott) to forty-five and eight-tenths per cent. (Estill), and in 1910 from twenty-three and five-tenths per cent. (Leslie) to fifty-six and four-tenths per cent. (Wolfe). (*Ibid.*)

[D]The expenditure for machinery and implements in 1900 varied from $19,480 (Knott) to $43,200 (Estill). In 1910 there was a variation of from $19, 448 (Leslie) to $68,964 (Estill). (*Ibid.*) Mowers, horse-rakes, and occasional binders and threshing machines are the only improved implements found. Scythes, cradles, and flails are in general use.

[E]In 1890, there were no expenditures for fertilizers in six counties (Clay, Knott, Lee, Leslie, Owsley, Perry) and the amounts in the other counties were insignificant. In 1900, there was a small expenditure in each county. The same was true in 1910, although there was a slight decrease in some counties. Manure is as yet the chief fertilizer used and this is generally confined to the vegetable garden. In 1910 the expenditures varied from $1,412 on seventy-seven farms in Breathitt to five dollars on one farm in Leslie. (*Ibid.*)

from the numerous springs and fattening upon the tender underbrush and mast. As yet, hogs feed upon the "sweet mast" of the white oak in the fall and in the spring on the roots and stems of young seedlings as well as the "bitter mast" of the black oak which has frozen or begun to sprout. Cattle and sheep too browse on the seedling and sprout reproductions for there is little else for them to eat except Japan clover (crap-grass), cane, and wild vetch, which grow only on the more fertile soils.

The use of the forest as pasture land has been increasingly expensive and a growing menace to the industry. By the intermingling of all kinds of stock the breeds have deteriorated[A] and contagious diseases have been spread. With the gradual destruction of the forest the "range" has become impaired and has retreated great distances from the farms. Owners often spend days hunting for animals which have wandered far in search of food. The loss of calves and other young animals from exposure has been enormous for the only shelter in time of storm is the rock-house on the precipitous cliff.

As property rights become better defined the injury to the forest caused by the stock is more and more resented by the proprietors. In some localities it is already prohibited by effective laws.[17] Under such circumstances the number of animals must be reduced or land must be cultivated for pasture.

Until recently corn and "blade fodder" have been the chief food of the stock kept on the farms, but cow-pease (pea-hay) is now sown in small quantities and cut green for fodder. The

[A]High-bred stock has been taken into the mountains at various times by the more prosperous farmers. Before the Civil War, valuable stock passed over the transmontane roads on their way from the Bluegrass to the eastern markets (Verhoeff, The Kentucky Mountains, pp. 98-100) and the mountain stock was doubtless replenished from this source. The Census of 1890 showed the majority of cattle to be of common stock, but there were a number of fine breed in each county. Clay County showed forty pure breed. Berkshire boars have been introduced but hogs in general are of the "long-nosed wattled breeds known as razor-backs," noted for their ability to "make a living in the woods." (Annual Report, Kentucky Bureau of Agriculture, 1878, p. 441.)

growing of peanuts is also increasing. The nuts are used to feed the hogs, and the vines as hay for horses and cattle. On the whole, however, different grasses are the preferred crops. Deep-rooted leguminous plants fertilize the land and permit of several cuttings a year. A small acreage of millet, timothy top, orchard, and other grasses are now sown in each county and the crops are successful except on the steeper slopes or on exhausted land.

In spite of the introduction of better methods of agriculture and stock raising which are bound to improve conditions, it is not probable that the farms will ever furnish a large traffic to either river or rail. In the first place modern machinery is expensive and can be used only on the bottoms. Hand labor is required on the ridges so that grains can not be cultivated economically. This in turn limits the feeding of stock, and grazing over extensive areas is impossible because most of the ridges are too steep to hold pasture against the heavy rains.

Horticulture on an extensive scale appears to be impracticable even though new methods are a great aid to the industry. The planting of special varieties increases the yield and prevents loss from early frost but the damage from insects and fungi is difficult to avert because the steepness of the slopes makes the use of the spray too expensive.

Heretofore the farm has furnished a bare living to the owner but at present it does not provide him with the ordinary essentials of life.[A] A revolution in the system of agriculture is necessary

[A] In 1910, the total value of farm products in the eleven counties was $8,433,971, which was $69.59 per capita or $348 for the average family. The items were as follows:

Crops	$5,523,024
Livestock	1,920,672
Poultry and eggs	525,308
Dairy products	418,275
Honey and wax	31,492
Wool and mohair	25,200

(U. S. Census, Computed.)

not only to further the prosperity of the farmer but to prevent damage to the slack-water system and to the shipping upon it. The slopes should be covered with a proper vegetation or be manipulated in some effective manner to overcome erosion. Now, every year deep gullies are washed in the abandoned fields so that soil, rocks, and gravel are carried down the streams to form obstructions in the improved channel.

SALT

Two principal sources of water containing common salt (Na Cl) have been indentified in Kentucky—the sandstone of the Conglomerate formation at the base of the Coal Measures, and the basal strata of the Ordovician period. Shaler, of the Kentucky Geological Survey, ascribed its origin to sea water imprisoned in the rocks during deposition, but later geologists regard the water as derived from meteoric sources and the mineral matter as dissolved out from the rocks during long courses through underground channels.[28]

The Kentucky Geological Survey[29] of 1859 refers to the two reservoirs:

"In the first and most recent of these sandstones the water is generally so strongly impregnated with salt as to be a profitable brine to work, containing from twenty-five to fifty pounds of common salt in one hundred gallons of water. In the second or more ancient of these sandstones, the water is also generally impregnated with salt to the extent of six hundred to seven hundred grains in a wine glass, mixed, however, with a variety of other salts and mineral substances."

In the mountain counties, the brines of the Conglomerate formation can be reached readily by boring, while the lower reservoir lies deeply buried beneath a mass of strata. In the Bluegrass, where the Coal Measures are lacking, this is easily accessible to the drill.

The brines from these sources and others of less value, appear at the surface as springs, the basins of which rich in salt, were formerly the rendezvous for wild game and were known as "licks."[30]

The pioneers of Kentucky regarded the proximity of such springs as an essential requisite[A] in the location of a settlement, as they had been taught by the Indians to manufacture[B] salt from the brine. Salt was used in large quantities at this time for the preservation of meat, and its transportation over the mountains from seaboard markets was practically prohibited by the expense.

[A]The salt supply of the United States previous to the Revolutionary War was obtained from Europe and the West Indies (Turk's Island, etc.). At the breaking out of hostilities the importation was cut off and salt was manufactured by evaporation of sea water along the coast—transported over the mountains it sold for eight dollars a bushel. After the War of 1812 importation was renewed and salt sold for fifty cents a bushel at the seaboard, while three dollars in the interior was considered a low price. (U. S. Census, 1860, Introduction, p. CCII.)

[B]"The first attempts to produce salt were characterized by the rudest simplicity. The ordinary pots and kettles used in the cabins were hung over an open fire to which was transferred the brine laboriously dipped from the spring. In this way, twenty or thirty men were able to manufacture a few bushels of salt in a month." Later, improvements were introduced.

"The brine was then collected in pits some twenty feet deep and transferred from thence to kettles designed for the purpose. These were of yellow copper, had a capacity of two hundred pints, and for some years were solely manufactured at Probes Furnace in West Liberty, Pennsylvania. Ten or twelve of these kettles were arranged in a row upon a trench four feet in depth and of a breadth suitable to afford a support for them. The interstices between the kettles were stopped with clay forming a rude sort of furnace which was universally used in this region for many years. In both ends of this trench a wood fire was maintained night and day, but the cutting and transporting the fuel and the weakness of the brine made the cost of the manufactured article reach four dollars per hundredweight at the furnace, which proved a fatal obstacle to its exportation."

Subsequently the furnaces were enlarged to accommodate sixty kettles and a stronger brine was obtained by boring. Hollow gum trees overlapping each other were sunk to considerable depths and the brine pumped from the wells by hand or horse-power and conveyed by means of troughs directly to the kettles. "Such works had a daily capacity of thirty-five to forty bushels, and by increasing the number of furnaces to ten or fifteen the annual product was raised to 150,000 bushels and the proportional cost of labor was so reduced that the manufactured product sold at a dollar and forty cents per hundredweight. At this price this commodity became the leading article of export and was shipped in large quantities to Nashville where it was disposed of for money, furs, cotton, etc." (History of Kentucky by Perrin, Battle, Kniffin, p. 229. Kentucky Senate Journal, 1837-1838, Appendix, p. 116. Michaux, Travels, Thwaites, Vol. III, p. 149; Cuming, Sketch of a Tour, etc., Thwaites, Vol. IV, p. 165.)

Soon after Kentucky was settled, therefore, salt manufactured in the Bluegrass, at first from the springs and later from wells, supplied the home market and became for a time the principal article of trade. To encourage the industry the Virginia Assembly[A] had passed a number of laws, and after Kentucky became a State the legislature granted to manufacturers special privileges[B] such as low rates for land, and roads[B1] over which salt must be carried as well as streams were improved.

By 1812 the output in the central part of the State had declined because of competition with products from the Kanawha River works sent down the Ohio and which soon afterwards monopolized the market.[C] The mountain brines, however, had been exploited for a decade[D] and more, and richer although less

[A]A petition to the Virginia Assembly from the "Inhabitants of the county of Kentucky" dated November, 1777, stated that the settlements had been for some time "destitute" of salt as manufacture had been impossible because of danger from Indian attacks. It was also set forth that many of the salt springs were claimed by persons who would not go to the "pains" or "expense" of erecting "manufacturies" and the State was asked to make such springs "public property" and to manufacture salt. (Robertson, Petitions of the Early Inhabitants of Kentucky, No. 6, pp. 43-44.)

Robertson (p. 44) notes the following acts of the Virginia Assembly, showing the importance of a conservation of salt and the encouragement of its production: An ordinance for erecting salt-works in the colony and for encouraging the making of salt (Hening, Vol. IX, p. 122); An Act for encouraging the making of Salt (*Ibid*, p. 310); An Act authorizing the seizure of Salt in the same manner as provisions for the use of the army (*Ibid*, p. 381). The preamble to an Act to supply the inhabitants of the commonwealth with salt upon reasonable terms, reads: "Whereas, divers ill-disposed persons have possessed themselves of large quantities of salt which they have not only refused to sell at any reasonable price, but to enhance the value of their own salt," etc. An embargo was placed on the shipment and the freeholders might seize salt upon warrant issued by a justice of the peace.

[B]See Verhoeff, The Kentucky Mountains, pp. 127-132. December 18, 1801, the right of way through "other people's property" was granted to owners of salt licks for the conveyance of salt water through troughs to "timber." (Littell, Vol. II, p. 438.) An act of February 21, 1813, provided that tracts not exceeding 1,000 acres in extent and including salt springs could be obtained at the following rates on the condition that the purchaser took oath as to his discovery of salt water and as to his intention of erecting works: First rate land, $100 per 100 acres, second rate land $50 per 100 acres, third rate land $20 per 100 acres. (Littell, Vol. V, p. 54.)

[C]See p. 103, Note A.

[D]In 1810 about one-half the State production (323,870 bushels) was produced in the mountain counties (160,388 bushels). Of this 43 per cent. was from Clay County and 53 per cent. from Greenup County which then included the works on the Little Sandy near what is now Grayson, Carter County. The price of salt throughout the State was one dollar a bushel. (United States Census, 1810.)

accessible than those of the lowlands, they continued to supply the immediately surrounding districts which were cut off from trade centers by the high cost of haulage.

The manufacture of salt[A] was carried on in the Kentucky basin for a longer period than elsewhere in the State.

A road law[33] of January 28, 1817, mentions salt-works on the North Fork.[B] In 1836 there were a number[33] of establishments in that valley; one on Troublesome Creek near the mouth, two near the mouth of Lick Branch, one at the mouth of Leatherwood, and a well partly bored at Hazard.[C]

The principal establishment located near the mouth of Leatherwood Creek,[D] Perry County, was opened[34] in 1835, and in 1840 it represented an invested capital of $18,000. Eleven men were employed and there was an annual output of 7,000 bushels.[35] These works and the establishment on Troublesome Creek,[E] Breathitt County, were opened occasionally until the

[A]Many springs contain a larger quantity of other minerals than of common salt. Various combinations of sulphur give the water a medicinal value. Estill Springs, near Irvine, Estill County, have been for years a source of wealth to the owners as a health resort. (Collins, Vol. II, p. 167.)

[B]See Verhoeff, The Kentucky Mountains, p. 166, Note B.

[C]At Hazard, Perry County, 108 miles above Beattyville, an excellent brine was obtained at 400 feet, yielding a bushel of salt from eighty-five gallons, but the manufacture was short lived because of local competition. (Kentucky Geological Survey, Old Series, Vol. I, p. 228; Report of Chief of Engineers, U. S. A., 1879, p. 1404.) Wells were also sunk at Whitesburg, Letcher County, 152 miles above Beattyville, but the brine was much weaker, the water at 300 feet yielding a bushel of salt from 125 gallons. (Kentucky Geological Survey, Old Series, Vol. I, p. 229.) This establishment appears to have been in operation as late as 1873 although it could not supply the demand of the immediate locality. (Collins, Vol. II, p. 264.)

[D]The works at Leatherwood, 113 miles above Beattyville, were established by General White and Colonel Brashear, and for a time produced 250 bushels a week which was considered ample for the local demand. (Kentucky Senate Journal, 1835-1836, Appendix, p. 38.) In 1838 there was a capacity of fifty bushels a day and sufficient water for a yield of three times that amount. (House Journal, 1838-1839, Appendix, p. 120.) The Kentucky Geological Survey of 1854-1855 (Old Series, Vol. I, p. 228) notes: "At the mouth of Leatherwood Creek salt was reached at one hundred feet but not very strong; the borings were afterwards sunk by Brashear four hundred and ten feet . . . . . at which depth a fine brine was reached yielding when economically worked a bushel of salt from sixty-five to seventy gallons."

[E]The works on Troublesome, fifty-two miles above Beattyville, were situated one and a half miles upstream near the mouth of Lost Fork, and in 1838 the daily capacity was ten bushels. The brine obtained at 420 feet produced a

recent railroad extension up the valley, but the product was never more than sufficient for the local demand.[A] On Middle Fork the works were of even less significance.[B] The failure of various enterprises on these forks was attributed by the State Geological Survey[36] to inferior brines and the lack of transportation facilities:

"Attempts have been made to obtain salt by boring wells at various points on the North and Middle Forks, but the abandonment of them all shows a lack of financial success. This is probably chiefly due to conditions independent of the supply obtained, among others the market accessible, but for a few of them it must be attributed to weak and insufficient brine."

The successful establishments were situated upon the tributaries of South Fork in the vicinity of Manchester, Clay County.[C] In all probability, salt had been manufactured there by the Indians before the region was settled. According to Collins:[37]

bushel of salt from 100 gallons. (House Journal, 1838-1839, Appendix, p. 120; Kentucky Geological Survey, Old Series, Vol. I, p. 211.) This is probably the establishment referred to in the Census of 1840 as in Breathitt, with a product of seventy bushels and three men employed.

[A]Until the railroad reached Jackson (forty-six miles above Beattyville) the price of salt in this section of the valley was at times one dollar a bushel (Kentucky Geological Survey, Old Series, Vol. I, p. 211), and until the extension to headwaters a haul of sixty miles was necessary from the supply at Jackson. Much of the salt used in this section was hauled through Pound Gap from Saltville, Virginia. (Verhoeff, The Kentucky Mountains, p. 160, Note A.)

[B]During 1818 a small quantity of salt was manufactured "high up" on Middle Fork. (House Journal, 1818, pp. 130-132.) An act of November 7, 1821, refers to the Garrard Salt-Works which were probably located near the junction of Cutshin Creek in Leslie County, fifty-nine miles above the mouth. (Kentucky Geological Survey, Old Series, Vol. I, p. 214.) This well was mentioned in a State report of 1836 but was not in operation at the time. (House Journal, 1836-1837, Appendix, p. 93.) A State report of 1838 (Senate Journal, 1838-1839, Appendix, p. 121) notes: "I was informed that about eight miles above where the survey was commenced (crossing of the Manchester-Hazard road, 68 miles above the mouth) a considerable quantity of salt was formerly manufactured but for some cause the works are not at present carried on and I am not apprised that any of this article is now made upon or near the Middle Fork." These works were not revived and borings made later at other points were unsuccessful.

[C]An analysis of the brine at Goose Creek Salt-works, Clay County, shows sixty-five parts of common salt (Na Cl) to one thousand of water. Large quantities of the soluble salts of barium and strontium detract from the value. The former is injurious to animal economy and must be removed. (Kentucky Geological Survey, New Series, Vol. IV, pp. 51-52.)

"The first Settler, or first white man known to have entered within the present boundaries of Clay County, was James Collins, in 1798. He built his cabin upon the headwaters of Collins' fork, and in 1800, at a salt spring which he discovered when following a buffalo trail some months previously, made the first salt ever made in the county. But the Indians had manufactured salt here before James Collins as evidenced by a large Indian (or aborigine) burying ground near the salt spring, by a flight of stone steps from the spring to the high or table-land, together with a huge heap of earthen and muscle-shell pots and a great mass of charcoal at the same place.

"James White, Senior, of Abingdon, Va., was the quartermaster of Gen. Cox of Tennessee, whose duty was the protection of the white settlers of this frontier. When White was at Lexington purchasing supplies for the army, he heard of the salt spring and hastened to buy the land that embraced it, a purchase which has proved a source of great wealth to his family."

By 1802, two establishments had become sufficiently important to warrant the improvement by the State of roads[88] leading to them. In 1810, according to the United States Census, there were four establishments[A] in Clay County producing annually a total of seventy thousand bushels, valued at $70,000.

[A]One road led to Outlaw's Salt-Works, near the head of Collins Fork, which was perhaps the site discovered by Collins, and the other to Langford's Lick probably near the point where Collins Fork and East Fork (Left Fork), unite to form Goose Creek, 69 miles above Beattyville and 27 miles above South Fork. By 1810 these sites, known as the "upper" and "lower" Goose Creek Salt-works (Verhoeff, The Kentucky Mountains, pp. 127-129), had probably come into the possession of the White-Garrard family, the present owners. The works at the mouth of Collins Fork were the most important and those of James Garrard and Sons referred to in early navigation laws (see pp. 21-22) were probably located there.

The White family owned works at both places. A deed dated February 6, 1804, transferred to James White one-fourth of 400 acres in Madison County (now Clay) on Collins Fork of Goose Creek patented by Jacob Meyers, including salt-works occupied by Alexander Outlaw, senior, and John Ballinger, and the appurtenances thereof, namely, "kittles, buckets, troughs, oxen carts." White was to pay on demand $1,100 in merchandise from his store in Abingdon, Virginia, and fifty dollars in money and was guaranteed possession of the property by April, 1804. The deed also transferred to White from Ballinger 400 acres adjoining the above tract for $400 in merchandise. (Kentucky Deed Book, pp. 31-34.)

Under date of August 12, 1806, John White made good to John Amis the title of one-fourth of 375 acres including the Goose Creek Salt-works (lower works), White reserving for himself the privilege of "wood and water" for one furnace.

The reduction in the price of salt which began soon after 1812, for a time affected the mountain industry. The commissioner's report[39] for the Kentucky River dated January 6, 1819, stated that on account of the low price, two years previously a number of works on Goose Creek had been closed. During 1818 only five thousand bushels were manufactured.[A]

In 1831, a tool[40] for boring was invented and after that date wells were sunk to a greater depth and richer brine was obtained. About that time, too, coal obtained at little expense from the banks of Goose Creek was substituted for wood as fuel.[B] Both of these improvements led to increased production.[41]

The industry in Clay County reached its climax during the decade 1835-1845, when the annual production ranged from 200,000 to 250,000 bushels,[C] from eight to fifteen wells.[42] The

Two acres of the most eligible and advantageous land of the tract was to be reserved for "mantion houses" upon which neither party could "dig" for salt water without the consent of the other. Within one year the reservation was to be equally divided between White and Amis. The tract of land including the salt-works had on June 22 of the same year been sold to Amis by John Crook for the sum of $2,300, one half of which was to be paid in cash and the remainder in "good salable salt at two dollars per bushel." By the deed one half of the buildings and half the garden owned by Crook were "secured" to John White. (Deed Book A, pp. 21-23. Courtesy of Mr. John White, Louisville, Kentucky.)

It is possible that there were works on Goose Creek at the mouth of Tan-Yard Branch, the site of "old Manchester" a few miles south of the present county seat. Ashes and other evidence of manufacture can still be found near the spring at that point. There were works established on Red Bird Fork about this time. In 1815 an act provided for the improvement of the stream to the works of Colonel John Gilbert (see p. 22, Note B) and the State commissioner notes in 1818 that there were works about thirty miles up the stream owned principally by Gilbert, but leased to William Allen Deas, of Charlestown, Virginia, "a gentleman of capital and enterprise." There was no wagon road to the establishments and the commissioner regretted that he had not expended a larger sum for the improvement of the stream. (Kentucky House Journal, 1818, pp. 130-132.)

[A]There was no "tide" during the year and the entire output was sold to the local trade. The river shipments about this time had been averaging two or three times the quantity manufactured in 1818. (See pp. 92-93, and also Kentucky House Journal, 1818, pp. 130-132.)

[B]See p. 174, Note A.

[C]In 1836 there were fifteen wells, 250-430 feet deep, including one or two "partly" bored. Ten were in operation. The greater part of the annual product was manufactured from seven or eight wells a "little above Manchester on the

output decreased by one half in the following decade[A] and thereafter the establishments diminished rapidly in number.[43] Only four survived the Civil War.[B] Two of these, in 1885, together produced two thousand bushels.[44] They are still in existence and are opened occasionally to supply a local demand.[C]

An insufficiency of both capital and labor[D] hampered the industry, but the manufacturers found transportation their most difficult problem. A portion of the salt was sent by packhorse and wagon over the Wilderness Road and its tributaries. Some of this was marketed in the adjoining counties but the greater part was taken to Tennessee by way of Barbourville and Cumberland Gap.[45] This tedious method was exceedingly costly as tolls were exacted for maintenance of the steep mountain highways.[46]

East Fork of Goose Creek" where the brine was sufficient for 200 bushels of salt daily. (Kentucky House Journal, 1836-1837, Appendix, p. 93.) The Census of 1840 credits Clay County with a capital of $106,800 invested in salt-works, a labor force of 148 men, and a product of 106,000 bushels. In 1846, 200,000 bushels were produced from fifteen establishments. (Collins, Vol. II, 141.)

[A] In 1854-1855 there were seven establishments in Clay County and a product of 130,000 bushels. The center of the industry had moved downstream. Deep borings had proved unsatisfactory. The Kentucky Geological Survey of that year notes that productive brines had been reached by boring for many miles along Goose Creek particularly near the junction of Red Bird and Big Goose Creek. A brine of six degrees was first reached at 121 feet and fifteen degrees at 240 feet. For several years a brine at 293 feet was profitably worked. After two or three years borings were continued deeper and a brine was reached at 552 feet. The yield, at first about one and one-fourth pounds of salt per gallon, later decreased to one bushel from eighty gallons. Borings had also been made to a depth of 1,000 feet below the bed of Goose Creek, but without improvement in the strength or quantity of brine. (Kentucky Geological Survey, Old Series, Vol. I, pp. 67, 218.)

[B] In 1860 there were five establishments with a product valued at $21,190 (84,760 bushels), an invested capital of $40,000, and fifty-nine (59) employees receiving $9,578. In 1870 there were four establishments with a product valued at $20,920 (83,680 bushels), an invested capital of $16,500, and forty employees receiving $10,070. (U. S. Census.)

[C] One of these establishments, kept in condition until recently by the family of General Garrard, is located on Goose Creek near Manchester. It is of interest as the last representative of an extinct industry. The furnace, consisting of two rows of kettles under a rough shed, was typical of the improved works of the early nineteenth century. The water was pumped from the well by a wheel turned by a diminutive mule.

[D] James White in 1835 was refused permission by the legislature to import negro slaves to work at his establishment. (Kentucky Senate Journal, 1835, p. 79.)

The Kentucky River Navigation

Transportation by water was cheaper even before the main river was improved. Shipments probably began about 1810 when the South Fork was improved for the first time. In 1818 it was estimated that favorable water stages meant an annual gain of from $5,000 to $7,500 to the manufacturers.[47] Accordingly, the bulk of the product, that is, from sixty to seventy-five per cent., was shipped downstream to landings[A] on the Kentucky.[48] The flatboats were of necessity small with a capacity of no more than fifty or sixty tons.[49] They were always subject to delay and often to total destruction. A State Report of 1837-1838 gives an idea of the difficulties[50] encountered:[B]

"It is necessary to navigate the Goose Creek by day on account of the short bends and other obstacles to be avoided so that boats which leave the salt-works above Manchester arrive at the mouth of Red Bird in the evening, and are obliged to remain over night; but on the following morning there is seldom water sufficient to pass the narrows and they are compelled to await another tide."

Some of the manufacturers were men of enterprise and comparative wealth and they exerted every effort to expand the trade by furthering internal improvements. In their opinion, when the industry was at its height, a system of slack-water would have tripled the annual output of the salt-works.

The Board of Internal Improvement in 1836 reported:[51]

"The river is the principal channel for the conveyance of this salt to market. It is shipped in flatboats and sent down during winter and spring while the water is high to the country below. The delay and hazard connected with this kind of transportation operates against the interest of the manufacturer and limits the

[A] In the early years of the industry the salt was perhaps sent long distances to market but by 1835 most of it went no further downstream than Cleveland's Landing in Fayette County. (Kentucky Senate Journal, 1835-1836, Appendix, p. 39.)

[B] See Garrard's report for South Fork, p. 23, Note D.

quantity of salt which he can produce. It is said if means of conveyance could be had at all seasons of the year at a moderate expense, that 400,000 to 600,000 bushels would be manufactured."

Open channel work assisted the industry, but as transportation facilities increased in the surrounding regions of Tennessee and Kentucky competing products captured the market, and when railroads reached the Three Forks bringing salt from other states manufacture was no longer profitable and soon ceased.

IRON

A brown hematite found on top of the Subcarboniferous (Newman) limestone along the entire western margin of the coal field attains its maximum thickness in the Kentucky River basin. Fundamentally a carbonate,[52] the ore near the surface is changed by weathering to a limonite. It is everywhere erratic in distribution and composition. The thickness varies from a few inches to three feet within short distances and the ore which averages forty-three per cent. of metallic iron often suddenly becomes a calcareous deposit because of the underlying limestone which acts as a solvent.[A]

During the period in which charcoal iron was in common use for smelting,[B] this ore and the limestone, in close proximity to a vast forest, rendered iron manufacture economically possible[C] in the counties of Estill, Powell, and Lee, of the Kentucky

[A]For analyses of the ore, see Kentucky Geological Survey, Part XI, Vol. II, New Series.

[B]The State, as in the case of salt, encouraged the iron industry by granting privileges to manufacturers. The price of land in the mountains was reduced at various times for the benefit of purchasers who planned "to make iron or castings." (Littell, Vol. II, pp. 531, 536.) By act of February 3, 1813, persons "actually employed about any iron works" were excused from militia (road) duty. (*Ibid*, Vol. III, p. 66.)

[C]Attempts were made to substitute coal from local mines for charcoal, but the deposits in the lower counties of the coal field contained too much sulphur for use in the manufacture of iron. (See p. 169, Note A.) Since the discovery of coking coal at the headwaters of North Fork in 1882, the Pine Mountain region has been regarded as a possible iron making center. Along the face of the escarpment, the

basin, and in adjoining counties of the Licking basin which together were known as the Red River Iron District.[53]

In the Kentucky basin the early works were located on Red River near the mouth of Hardwick's Creek in the vicinity of Clay City, Powell County.[54] A dam built at that point rendered the river above navigable for small boats and furnished water-power for a blast-furnace and other machinery. The ore was mined from isolated knobs within a mile or two of the works and shipped in flatboats downstream to the dam.[55]

A forge which ran four bloomery fires was built here at an unknown date.[56] Imlay's map of Kentucky, published in 1793, shows a settlement in the region, and it is possible that the forge was in operation at that time.[57] It is doubtless the establishment of Clark and Smith referred to in a State act of December 4, 1805, for the improvement of Red River.[A]

Subcarboniferous limestone with its ore which falls below drainage in the lower counties is here again exposed. The Oriskany ore is also brought to the surface with the Devonian formation and the Clinton or Dyestone ore, a red hematite occurs with the Silurian formation along the foot of the mountain, but so far as known is not exposed at the surface. As yet the thickness, persistence, or quality of these ores have not been determined, but the twisted and contorted condition of the strata is in itself unfavorable to exploitation as expensive slope mining is required. (Kentucky Geological Survey, Report on Progress of Survey, 1886-1887, p. 13. Verhoeff, The Kentucky Mountains, pp. 15, 20. Annual Report, Kentucky Inspector of Mines, 1901-1902, pp. 334-338. *Ibid*, Chapter XV, pp. 11-12.) The counties between Pine Mountain and the Red River Iron District contain iron ore of the Upper Coal Measures which reach their maximum development in the Little and Big Sandy basins. In the Kentucky basin there are occasional outcrops of excellent quality but the deposits are nowhere persistent. (Annual Report, Kentucky Inspector of Mines, 1901-1902, Chapter XV, pp. 49, 105-107.)

Some of the ores contain considerable quantities of hydrated silicate of alumina which has been mistaken for silver. (Kentucky Geological Survey, Old Series, Vol. I, p. 122.) The remains of numerous furnaces in the region are probably works erected at an early day by parties in search of Swift's Silver Mine which tradition has located in every mountain county. John Haywood (History of Tennessee, pp. 33-34) says that Swift was in East Tennessee in 1790 and 1791 and from his journal "it appeared that in 1761, 1762 and 1763 and afterwards in 1767, he, two Frenchmen and some few others had a furnace somewhere about the Red Bird Fork of Kentucky River . . . he and his associates made silver at the last mentioned furnaces; they got the ore from a cave about three miles from the place where his furnace stood. Indians becoming troublesome, he went off; and the Frenchmen went towards the place now called Nashville." (Collins, Vol. II, pp. 414, 614, 762. Verhoeff, The Kentucky Mountains, pp. 18-19, Note A. Howard Flanagan, a Lost Mine and a Buried Treasure, Appleton's Magazine, October, 1906.)

[A] See Note C, p. 22.

A furnace, the second in Kentucky,[58] was constructed in 1806 or 1808. About 1810, there were in operation[59] a blast-furnace, a knobbling fire, and a forge.[A]

The furnace on account of the "distance from the ores" was closed in 1830.[B] The following year it was dismantled and removed to what is now Estill County.[60] At the same time the forge was improved for the manufacture of bar iron, blooms, nails, and castings. The Red River Iron Works soon afterwards became celebrated for the excellent quality of metal produced.[61]

In 1837 there was added to the forge, a rolling mill[C] containing seven furnaces, two trains of rolls, and five nail machines. In the mill, blooms from the forge were worked into merchant bar iron and nails. Exhaustion of the timber necessitated the closing of the mill[62] about 1859.

Various attempts to substitute coal[D] for charcoal were rendered futile by the character of the deposits available as well as by the difficulty of transportation. According to Collins:[63] "About 1840, a new rolling mill supplanted the old forge, and coal from near the Three Forks of the Kentucky River was employed as fuel; this coal was flatboated from Beattyville down the river fifty miles, wagoned nine miles up Red River to the Iron works; it was not found suited to make good iron and its use was abandoned. About 1860 the manufacture of iron at the mill was discontinued."

[A]The Census of 1810 reported for Estill County, which then included Powell, one forge valued at $10,000, with a product of eighty tons, and one furnace.

[B]Under date of March 21, 1827, the Red River Iron Works advertised in the Kentucky Reporter as on sale in Lexington "every description of castings, machinery, etc.," and as on hand at the works bar iron "equal to the best" and "Juniata hammered and superior rolled iron."

[C]In 1840, according to the Census report, there was a capital of $112,000 invested in the iron works of Estill and Powell Counties. There were 104 men employed and seven furnaces, with a total product of 900 tons of cast iron and 160 tons of bar iron.

[D]See p. 157, Note C.

The Kentucky Geological Survey[64] of 1857 refers to the use of coal from the Red River Valley, Powell County: "Near the mouth of Wolf-pen and Chimney, the Coal Measures begin with a twenty-three to twenty-five inch coal near their base. The same bed also occurs up the valley of Cow Creek. This bed has supplied coal for the Red River Forge and Rolling Mill; but great difficulties have been encountered in running it down in boats since it has to be brought during the highest freshets when in consequence of the number of rocks in the bed of the river and the cross currents from the lateral torrents rushing in from the tributaries, many boats are wrecked in the descent."

The forge, which in 1859 contained four fires and one hammer run by water, made blooms from metal manufactured at the furnace in Estill County, until the Civil War when it was closed permanently.[65] The mill, rebuilt[66] in 1865 by the Red River Iron Manufacturing Company, was operated for only a few years.

The greater part of the Powell County products were sent to distributing centers over the Mount Sterling-Pound Gap Road, a state transmontane highway.[67] Very little was trusted to the river. A system of slack-water would probably have stimulated the industry for a time, but this in turn would have hastened the exhaustion of timber and ore in Powell County and the removal of the works to Estill where the raw materials were found in much greater abundance.

Meanwhile two charcoal furnaces (Cottage and Estill) had been built on the ridge[A] dividing the Kentucky and Red Rivers in Estill County, which became the center of both mining and

[A]The ridge is drained on the north by the headstreams of Hardwick's Creek and the western branches of Cat Creek and Middle Fork of Red River, and on the south by Millers Creek and Cow Creek, which enter the Kentucky a short distance above Irvine. (Kentucky Geological Survey, Reports on the Eastern Coal Field, C, p. 15, 1884.)

manufacture in the district. The furnaces[A] were run by steam but were of the primitive ante-bellum type. Operations were interrupted by the war.[B] At its close the old furnaces were remodeled and two new ones constructed after the most improved patterns with a yearly capacity of 3,000 to 4,000 tons each, which was about four times as great as that of the older sort.[68]

Collins[69] describes in some detail this enterprising business venture:

"In 1865 the Red River Iron Manufacturing Co. was chartered and organized with a cash capital of $1,000,000, which sum was actually expended in the purchase of all the estate belonging to the Red River Iron Works and in the improvement of that property. The works at the old forge on Red River were not revived but the mills there were rebuilt and improved. Estill furnace was put in blast in May 1866; many buildings were erected, turnpike roads were built, and the iron was wagoned eight miles to Red River and shipped by flatboats. In 1868 the company began and in less than two years completed two of the largest charcoal furnaces in the world, with inclined planes, tramways, macadamized roads, mills and shops, and homes for over 100 families; employing 1,000 men for more than a year. A town was chartered at the new furnaces called Fitchburg after the two brothers, Frank Fitch, the general superintendent, and Fred Fitch, the secretary and treasurer. In 1869 the iron from Estill furnace was diverted from the Red River route and wagoned 3 miles to Fitchburg; thence together with the product of the two great furnaces which went into blast March 4, 1870, taken by a new tramway 6 miles to Scott's Landing on Kentucky River near

[A]The Estill Furnace was built here in 1831, ten miles southeast of its old site on Red River. Remodeled in 1849, it is described by the Survey of 1859 (Kentucky Geological Survey, Old Series, Vol. IV, p. 473) as a "quarter furnace" with an annual capacity of 2,500 tons of pig metal which chilled to a depth of one-sixteenth inch in the pig. Cottage furnace built in 1856 was also a quarter furnace and produced 725 tons of metal in 1857. (*Ibid.*)

[B]The Census of 1860 gives the following details of production for the two establishments:

Number Establishments	Capital invested	Material Cost	Labor Number	Labor Cost	Products Value
Iron blooms (1)	$50,000	$8,000	25	$3,780	$13,000
Pigs (1)	60,000	8,845	12	3,744	20,000

the mouth of Miller's Creek. In 1871 nearly 10,000 tons of pig iron were turned out, valued at $600,000.

"In 1871 the Estill Iron Co., a new concern in the hands of skilled men with abundant capital, purchased the Cottage Furnace property."

The product was for the most part cold blast charcoal iron[A] used chiefly in the manufacture of car-wheels. A State report[70] of 1876 refers to it as follows: "It is of great strength and at the same time chills readily. It has commanded a market all through the west where it ranks with the best and most celebrated brands of car-wheel iron in the country."

The output[B] from the Red River District reached its height between 1870 and 1874. State reports[71] record a total product of 29,551 tons from the four furnaces in Estill County during the five years. One of the oldest furnaces was in blast[72] at intervals until after 1880, but none of the other works were in operation after 1874. The iron industry in the Kentucky basin may be said to have ceased in the latter year.

[A]Hot blast ovens were used for a short period at the Cottage Furnace and also at the Fitchburg establishments. (Red River Iron Manufacture, p. 26. Kentucky Geological Survey, Old Series, Vol. IV, p. 473.)

[B]The Census of 1870 gives the details of production for Estill County:

Establishments Number	Labor Number	Capital invested	Wages Amount	Materials Value	Products Value
3	425	$825,000	$58,888	$107,285	$200,700

The Kentucky Geological Survey records a total product of 31,685 tons of pig iron in the Red River District for the period 1870-1874, distributed as follows:

Furnaces	1870	1871	1872	1873	1874
Kentucky Basin					
Cottage	1,000	1,350	1,900	1,950	0
Estill (Red River Iron Co.)	1,169	1,380	1,967	1,375	388
Chandler (Red River Iron Co.)	2,109	3,855	2,564	613	0
Blackstone (Red River Iron Co.)	772	3,529	289	1,057	1,284
Total	5,050	11,114	6,720	4,995	1,672
Licking Basin					
Bath	0	0	0	795	1,339

(Reports on the Eastern Coal Field, C, p. 15. 1884.)

The decline of the industry was brought about by an increasing scarcity of both ore and timber in the immediate neighborhood of the works which made it impossible for the larger furnaces to turn out a capacity product, even when the market price was at its maximum. This was due in part to the methods employed. The surrounding forest was ruthlessly destroyed by lumbermen,[A] and mining operations were conducted by the native farmers in a desultory and wasteful manner.[B] Before manufacture ceased drift mining had been introduced, but in general the ore was obtained from outcrop by benching or stripping.[73]

It is possible that slack-water transportation might have led to more intensive methods and postponed at least for a few years the abandonment of the works. The principal markets for the iron were cities on the Ohio. Wagons were used to convey the product to Red River, and some of it was hauled twenty miles to a railroad, but most of it was shipped down the Kentucky in boats of eighty tons capacity.[74] During the panic of 1873 prices fell so low that the tax imposed by river transportation became prohibitive. The State Geological Survey of 1876 states the conditions:[75]

"Iron can be produced at these furnaces for much less than at many other localities which are nearer to market, as ore, labor, and charcoal are all cheap; but the facilities for transportation are so poor that it costs from seven to ten dollars per ton to carry the iron from the furnace to market at

[A]The two larger furnaces if in operation at full capacity would annually have stripped of its timber 800 acres of land, and in a few years the limit of economical haulage of charcoal would have been reached. (Kentucky Geological Survey, Reports on the Eastern Coal Field, C, p. 30.)

[B]In 1880 there were 3,000 tons of ore valued at $6,000 mined in Powell and Estill Counties for the Cottage furnace. (U. S. Census, 1880, Vol. XV, Table 14, p. 40.) The United States Census for that year describes the operations: "These ores are but poorly worked, the farmers of the neighborhood bringing it at will to the furnace and selling it by the ton. The management does not attempt to control the mines either as to time of work or method of mining." (*Ibid*, p. 293.)

Louisville or Cincinnati. This tax is so great that at present prices, it either entirely consumes the profits or leaves the margin so small that it is not worth the risk. . . . . Were there a railroad or slack-water transportation within a few miles of each furnace it would be profitable to make iron in this region, even at the present extremely low prices, but the necessity of wagoning it great distances or of awaiting the uncertain rises of the Kentucky River and the dangers of navigation when the rises come renders the cost of transportation entirely too great."

For more than a decade, both railroad and slack-water have been available. It is now possible, moreover, to obtain by rail from the headwaters of the Kentucky coal excellent for smelting and fuel, but there has been no attempt to resume operations. The lack of extensive iron deposits makes impossible competition with manufacture on a large scale in other states where ores from Lake Superior or the southern iron fields are readily accessible.

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CHAPTER VI

MOUNTAIN TRAFFIC—(Continued)

Since salt and iron have ceased to be manufactured in the mountains, coal and timber have been considered the only resources capable of furnishing a large traffic either to river or rail. The exploitation of petroleum is at present in progress but this product is piped from the region. Since 1900 the Standard Oil Company has completed a system of pipe lines and storage plants which provides transportation for practically the entire oil territory in eastern Kentucky.[A]

COAL

The coal of this region is a pure bituminous of which there are a number of varieties.[B] The geological distribution renders

[A]In the Kentucky basin, commercial production of petroleum was delayed until the completion of the pipe line, although prospecting has been in progress since 1859. (Kentucky Geological Survey, Old Series, Vol. IV, p. 472.) Exploitation has been on the wild-cat plan, diminishing and decreasing with the slightest fluctuation in the market price of crude oil. The industry has been carried on almost entirely by outside investors who buy the oil rights, paying the owners a royalty on profits.

The operations have been confined to Estill and Wolfe Counties. In Estill the supply is obtained from the vicinity of Irvine where shallow borings through Devonian black shale penetrate the Corniferous limestone or Ragland sand. Since 1905 a light grade oil has been shipped from these wells. Deeper borings, some of them almost 2,000 feet, have struck oil in the Calciferous strata of the Ordovician formation. In Wolfe, wells located in the vicinity of Campton at a depth of over 1,200 feet have produced most of the oil. This is not as high grade as the Whitehouse oil, from the Lee Conglomerate in a section of Knott County and other territory within the Big Sandy basin, which has been marketed since 1902.

The quality of oil varies within short distances but in general it compares unfavorably with the standard Pennsylvania product, since it contains more sulphur and asphalt and yields less gasoline. (Mineral resources of the United States, U. S. Geological Survey, 1907.) The oil-bearing rocks or sands begin in the Lee Conglomerate and are found in the underlying formations. No important sands have been discovered in the Upper Coal Measures, so that the only territory accessible to the drill is in the lower counties and at headwaters in the vicinity of Pine Mountain, where the Conglomerate formation is brought to the surface. (J. B. Hoeing, The Oil and Gas Sands of Kentucky, Kentucky Gelogical Survey, Bulletin No. 1, 1905.)

[B]The varieties are distinguished commercially as follows: (1) Steaming coal adapted to use under boilers. A low-grade coal of this character is found throughout the field. The highest grade containing a low percentage of ash and sulphur

the upper counties richer in the quantity of the mineral than the lower counties.

Along the entire western margin of the coal field there is exposed above drainage with the Lee Conglomerate formation a group of from two to six persistent seams known as the Sub-conglomerate and Inter-conglomerate coals. The thickness is erratic, varying from a few inches to three or five feet within short distances, and in places the coal is represented by carbonaceous streaks. In the lowest counties of the Kentucky basin, Estill and Powell, these are the only deposits, and since they outcrop in narrow Conglomerate ridges they are very inaccessible and limited in extent.[1]

Upstream the seams fall gradually with the strata toward drainage level and are finally[A] buried[B] beneath those of the upper measures which increase in number and thickness towards

occurs only at headwaters. (2) Domestic coal adapted to grate fires and other domestic purposes. A high-grade coal, free burning, low in red ash, and free from sulphur is also confined to the upper counties. (3) Gas coal used in the manufacture of illuminating gas. Coals of this class containing a high percentage of combustible matter and a low percentage of sulphur are found throughout the basin. (4) Coking coal adapted to the smelting of iron, copper, and other metals. For such purposes the coal must be transformed into a hard mass or coke by the liberation of volatile hydrocarbons and other gaseous constituents. This is accomplished by heating the coal to redness in an oven. A high-class coking coal must contain a low percentage of volatile combustible matter, a high percentage of carbon, and a low percentage of ash and sulphur. Sulphur is especially injurious in the smelting of iron. In general the coal of this basin produces an inferior product. So far as known there is only one high-grade coking coal. This is the Elkhorn seam at the headwaters, not only of the Kentucky, but of the Big Sandy and Cumberland Rivers. (5) Cannel coal, adapted especially for gas making but also used for domestic purposes. These coals, containing a high percentage of volatile carbons, ignite easily and burn with a yellow flame. The seams which occur throughout the basin in very limited areas or pockets varying from a few acres to several miles in extent are all thin and are generally mined in conjunction with other coals. (6) Splint coals adapted for domestic and steaming purposes. This coal is harder than the average coal of the basin and as it does not break when handled, ships and stocks well. In varying proportions it is common to all of the coal beds. It appears, however, to increase in quantity towards headwaters. (Kentucky Geological Survey, Bulletins Nos. 11, 12, 13.)

[A]The Kentucky Geological Survey (Bulletin No. 11, p. 10) notes: "It (lowest coal of Conglomerate series) sinks below drainage at St. Helens at the junction of North and Middle Forks and farther up those streams its depth below them is governed not alone by the fall and dip of the strata but also probably

[B]See p. 169.

the headwaters of the Three Forks.[3] Here at least eight workable beds are above drainage, averaging from three to five feet and attaining a maximum of from seven to nine and a half feet in thickness. In a small section of the Elkhorn District, a part of which is in Knott and Letcher Counties, there is a deposit estimated at 1,146,726,000 tons. Allowing thirty per cent. waste in mining the possible output is 800,000,000 tons.[3]

The quality[4] of the upper coals in general is also superior to that of the lower seams,[A] the latter containing a much higher percentage of sulphur and a less amount of fixed carbon. The

by an increase in the thickness of Conglomerate measures overlying the coal. This would probably result in carrying the coal within a few miles of those two forks to a depth prohibitive of mining for many years to come, for though in the vicinity of Whitesburg the Conglomerate measures appear above the North Fork level their thickness as developed on Pine Mountain is such as to carry the coal far below the surface. On the South Fork the case differs. There, the strata rises with the stream and the Conglomerate measures probably increase to much less extent, so that there is fair prospect of finding the bed of workable thickness at moderate depth as far as, and even beyond Manchester."

[B]The coals of the Conglomerate formation are again brought above drainage by the Pine Mountain fault. Along the ridge the seams have increased in thickness but the structure renders mining difficult and expensive.

[A]The upper coals compare favorably with the standard bituminous coals of the United States. The following table indicates the inferior composition of the lower coals:

Average Analyses of Eastern Bituminous Coals.

	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur
Pocahontas, semi-bituminous (average of 38)	0.73	17.43	77.71	4.63	0.62
New River (Quinnemont), semi-bituminous (average of 17)	.60	19.93	75.20	4.27	.67
Pittsburg (Connellsville), coking (average of 20)	1.130	29.812	60.420	7.949	.689
Clinch Valley gas coal	1.180	37.398	56.732	5.602	.619
Westmoreland gas coal	1.427	37.521	54.921	5.418	.713
Pennsylvania gas coal	1.280	38.105	54.383	5.440	.792
Kentucky Coals.					
Coals of Upper Coal Measures.					
Lower Elkhorn (average of 22)	1.425	32.105	58.435	7.459	.574
Upper Elkhorn (average of 19)	1.538	34.985	58.367	4.499	.587

conglomerate coals, however, have competed successfully with them for steaming and domestic purposes.

Except in Pine and Cumberland Mountains where the rocks are twisted and contorted, coal can be recovered at less expense throughout eastern Kentucky than is possible in the western part of the State, or in sections of the Appalachian field where slope mining is necessary. The numerous streams have cut so deeply into the Coal Measures that a large proportion of the deposits are above drainage. The horizontal structure of the strata, moreover, makes drift mining possible, while the slight local dips can be utilized to further both drainage and haulage. Ventilation is also easily obtained. In some cases the tunnels extend through the narrow ridges and a natural current is induced.[A]

Coals of Conglomerate Measures.

	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur
Beattyville Coal	2.10	38.10	51.64	8.26	3.991
Beattyville Coal	4.00	35.50	55.50	5.00	1.041
Beattyville Coal	2.30	38.10	51.64	7.96	2.356
Sturgeon Fork Coal	4.16	38.97	49.24	7.63	1.97
Sturgeon Fork Coal	3.53	40.51	49.00	6.96	2.60

(Bulletin 316, United States Geological Survey, Contributions to Economic Geology, p. 52, 1906. Kentucky Geological Survey, Bulletin 11, p. 11, 1910.)

The distinguishing feature of the Elkhorn seam is that it is a by-product coal. Formerly throughout the United States coke was manufactured near the mines in bee-hive ovens and the gas was wasted. At present not only coke and gas but tar and ammonia are obtained from the same coal at the same plant located in the cities. From the Elkhorn coal as much of each of these products can be obtained as from the standard coals which yield them separately. (Papers on the Manufacture of Coke, by William H. Blauvelt and F. E. Lucas, Kentucky Geological Survey, Series IV, Vol. I, Part II, pp. 1157-1186. The Consolidation Coal Company's One Hundred Thousand Acre Unit for the production of Elkhorn By-Product Coal in Pike and Letcher Counties, Kentucky, The Black Diamond, May 9, 1914, pp. 396-398.)

[A]The following comparison of the expense of mining between the Elkhorn District at the headwaters of the North Fork and the Connellsville District of Pennsylvania is by an expert mining engineer:

"The cost of pumping is of vast importance. I will note the case of a mine at Connellsville using twenty pumps with an output of 300,000 tons of coke a year. These were destroyed in five years by acid sulphur water. Their original cost and the expense of keeping them going was during that period a charge of seven cents a ton against the entire coke output. In this same mine the interest on cost of shafts and hoisting of machinery, cost of operations and deterioration, and the cost of ventilation showed further expenses, in all aggregating

Mountain Traffic

Coal in the Kentucky basin was noted in 1750 by Christopher Gist.[5] Returning from the west to Virginia by way of Pound Gap, he collected samples for the company which had sent him to inspect the land.[A]

Since the beginning of settlement in this region coal has probably been used to some extent to supply the needs of the primitive farming community.[B] Wood has been abundant for fuel, however, and industrial progress slow, so that until recent times there has been little inducement to mine for local consumption.[C]

Production for an outside market began at an unknown but early date. Until railroads penetrated the region the river

thirty-one cents a ton in favor of drift mining in the Elkhorn field where all the openings can be made so that the mine will be self-draining." (Report by R. N. Dickman, quoted in Louisville Courier-Journal, February 4, 1904. For description of mining operations in the Elkhorn District see The Black Diamond, May 9, 1914, pp. 382-385.)

[A]The specimens were probably from the divide between Red River and North Fork of the Kentucky in Breathitt and Wolfe Counties. (Johnston, First Explorations, pp. 154-155.)

[B]For many years the western extension of the coal deposits were not determined and black slate mistaken and mined for coal in a number of marginal counties discouraged exploitation. This occurred in the valley of Hardwick Creek, Powell County, and of Sturgeon Creek, Owsley County. (Kentucky Geological Survey, Old Series, Vol. IV, pp. 472, 477.)

[C]Blacksmith shops, logging engines, and sawmills consumed most of the local supply until the railroad era. Coal has now displaced wood for fuel. Even in the remote districts, stoves and grates are found in the log cabins. The coal outcrops on almost every farm and in many cases the farmer mines for his individual use as necessity dictates. As a rule an entire neighborhood is supplied by two or three men, usually native miners of some skill. The mine is leased and the owner is paid a royalty, which at present varies from ten to twenty-five cents per ton. The coal is mined by order and delivered in wagons or sleds, and is dumped in front of the houses where it remains exposed to the weather until it is consumed. The coal delivered brings five to eight cents a bushel.

A "farmer digging" produces five to seventy-five tons of coal annually, and is worked in the most primitive fashion. The excavation is usually carried not more than fifty or seventy-five feet beyond the outcrop, although tunnels of two hundred to three hundred feet are seen. These are worked until fall of roof is imminent and are then abandoned. They are not under State inspection, and drainage and ventilation are ignored. The most accessible coal is usually mined, but in some places a better quality is sought with some labor. Near Hazard, Perry County, a superior coal from the top of the river hills is transported in buckets by a crude aerial cable across the river to the town. The town of Hindman has been supplied from ridges at an elevation of 460 feet above Troublesome Creek by an aerial tramway. At Hyden, Leslie County, a 53-inch block coal is delivered by an incline from an adjoining hillside to the main street of the town.

was practically the only outlet, although occasional shipments by wagon were made from the lower counties. Workable deposits at water level first outcrop along the main stream in the vicinity of Beattyville in Lee County,[A] whence shipments may have been made shortly before 1801. In that year an act of the legislature for the improvement of the river to South Fork provided special toll rates for coal.[B] In 1805 an advertisement in a Frankfort newspaper offered for sale at the junction of the Three Forks a coal yard, boat yard, and coal banks, and stated that Lexington and Frankfort were consuming annually 18,000 bushels of coal which was purchased at the landing for a shilling a bushel.[C] A traveler[6] in 1807, referring to the Kentucky, writes: "Coals are brought down it nearly three hundred miles and delivered in Frankfort at sixpence per bushel, but wood being tolerably plenty they are used only in the penitentiary and by blacksmiths."

The industry was well established in 1835, when 75,000 bushels (3,000 tons) valued at $9,000 were marketed.[7] From that time development, though constant, was slow, and it was not until the coming of the railroads that the industry assumed larger proportions than that of a modern huckster's trade. In 1880, when probably the maximum tonnage was shipped by water, there was an output[8] of but 27,473 tons.[D] Within the

[A]From the mouth of Contrary Creek to about three-fourths of a mile above Beattyville the coals of the Conglomerate Measures are exposed and have been mined for many years.

[B]See Note D, p. 20.

[C]See Note A, p. 134.

[D]According to Mather, there was a shipment of 200,000 bushels (8,000 tons) in 1838. (House Journal, 1838-1839, Appendix, p. 243.) The Census of 1840 notes a total production in the Kentucky basin of 208,492 bushels (8,340 tons); Breathitt, 21,017 bushels; Clay, 88,950 bushels; and Estill, including Lee, 98,525 bushels. The Census of 1860 mentions only Breathitt County, where there were six establishments and a product valued at $7,550. In 1868, according to Collins (Vol. I, p. 189) eighty boat loads were sent down the river in January, and thirty in February, which meant a total of some 550,000 bushels (22,000 tons), and further shipments were expected on the April rise. The Census of 1870 does not mention mining. In 1880 the product was 500 tons from a mine on Spicers Branch of North

next few years river shipments decreased rapidly and finally ceased in 1894, when the last barge load was sent from Beattyville to Big Hickman Creek, in Jessamine County.[9]

As long as shipments were made by water the location of collieries was determined by accessibility to navigable stream[A] rather than by the quantity or quality of the deposits. The operations were therefore confined to narrow areas along the main streams where the seams were for the most part thin and erratic in distribution. There were commercial openings[10] on the Middle Fork,[B] but the shipments were insignificant. On

Fork, Breathitt County, and 26,973 tons from nine mines in Lee County in the vicinity of Beattyville. (Tenth Census, Vol. XV, Appendix, pp. 893-894.) In 1880-1881 shipments from the vicinity of Beattyville aggregated 24,000 tons (600,000 bushels), and for 1882-1883, 650,000 bushels (26,000 tons), valued at $81,250. (Report Chief of Engineers, U. S. A., 1881, Vol. III, p. 1976; 1883, p. 1564.) After 1883 the decrease was marked, and in 1888-1889 there were but 42,000 bushels (1,680 tons) shipped, valued at $5,888. (*Ibid*, 1889, Vol. III, p. 1975.)

[A]On a number of the minor tributaries in the lower counties, where water transportation was impossible, the coal was mined and hauled in wagons to towns in central Kentucky. Mines on Big Hill Ridge, at the headwaters of Station Camp Creek, shipped coal to Richmond, in Madison County. (Kentucky Geological Survey, Bulletin No. II, p. 42.) In the Red River basin there were mines at the mouth of Wolf-pen and Chimney Creeks, which for a time shipped coal down the river to the iron works near the mouth of Hardwick's Creek. (See p. 160.) The majority of the mines in that basin, however, were situated on the dividing ridge between the Red and Licking Rivers, and the coal was hauled in wagons over the old State Road to Mt. Sterling, where it was used for "blacksmithing purposes and the grate." It was also used as fuel by residents of the region who found it much cheaper than wood.

The coal mined in this basin was all from the lower seams. The Survey of 1856-1857 notes commercial openings on Indian Creek near the confines of Menefee and Powell Counties, operated by Morris McCormick. A later report (1859) refers to the principal mines as the Flower Hill Banks, two openings, at the head of the Ahmet Branch, where a 28-inch coal was mined, while to the southeast on another branch of Indian Creek McCormick owned the Tan Yard and Big Banks mines, where a seam of coal two feet nine inches thick was worked. Further east there was another mine where the coal was of equal thickness and of better quality. (Kentucky Geological Survey, Old Series, Vol. III, p. 28; Vol. IV, p. 467.)

[B]There was a shipment of 5,000 bushels down the Middle Fork during 1837-1838. (Kentucky Senate Journal, 1838-1839, Appendix, p. 121.) The principal mines at that time were on Rush Creek, about a half mile upstream, where a vein three feet ten inches thick was worked. (Kentucky Geological Survey, Bulletin No. 11, pp. 13, 181.)

During the decade, 1850-1860, there were shipments in "large canoes" from the Asher mines, two miles below Hyden, Leslie County, where the openings were probably upon the Elkhorn seams. (Thousandsticks, Industrial Edition, December 24, 1908, Hyden, Leslie County; Kentucky Geological Survey, Bulletin

South Fork[A] the coal was used almost exclusively for local purposes, but salt manufacture gave an impetus to mining and the output in Clay County for a time was as great as that of any other section.[11] The centers of the industry were on the Kentucky near South Fork, in Lee County, and on North Fork in Breathitt and Perry Counties, between Jackson and Hazard.

A report[12] of the Board of Internal Improvement for 1835-1836 refers to the coal mines:

"The principal veins that are now mined and which but ineffectually supply the markets of Lexington and Frankfort are near the mouth of South Fork (Beattyville); near the mouth of Troublesome Creek, sixty miles up North Fork where it is found in better quality than in any other part of the United States; and near Perry Court House (Hazard), fifty miles higher up the same fork."

A report the following year[13] mentions mines on the main river three miles below South Fork, and a number at the mouth of South Fork on both sides of the river. There were also twelve or fourteen on North Fork between Middle Fork and Hazard, and several on Troublesome and Quicksand Creeks.[B]

No. 11, pp. 13, 199.) The most important mine, according to the general report of residents, was on the main stream, a fourth of a mile above Squabble Creek, Perry County, where coal mined from the Haddix bed brought an advanced price in the market. (Kentucky Geological Survey, Bulletin 11, p. 178. Annual Report, Kentucky Inspector of Mines, 1901-1902, Chapter XV, p. 80.)

[A]The more important mines were on Goose Creek and its branches. In 1838 coal was dug in various places along the creek for the salt-works and for domestic use. (House Journal, 1838-1839, Appendix, p. 251.) According to the Survey of 1854-1855 (Old Series, Vol. I, p. 67), a bed on this stream near the level of high water, three and a half to four and a half feet thick, supplied the salt-works south of Manchester with fuel. The principal mine was owned by General Garrard, and was on the west side of Goose Creek in close proximity to his salt-works. The coal mined was the Manchester seam, the first above the Conglomerate Measures, which varied in thickness within the mine from twelve inches to forty-four inches. (Kentucky Geological Survey, Bulletin 11, p. 270.)

Another important opening on the same seam was at White's salt-works on the Left Fork of Goose Creek, about five miles south of Manchester. (Annual Report, Kentucky Inspector of Mines, 1901-1902, Chapter XV, pp. 64-67, Kentucky Geological Survey, Bulletin 11, pp. 270-274.)

[B]On Troublesome Creek the mines were located near the mouth and up its north fork, where openings on George's Creek were noted in central

According to Mather,[14] State Geologist, in 1838 the Haddix mines at the mouth of Troublesome Creek were the most extensively worked. A cannel coal, 273 feet above low water, was mined which was highly esteemed because it was "hard" and would "break equally well" in every direction. It was more expensive to mine than other coals and therefore was sold at a higher price.[15]

Later operations were practically confined to the vicinity of Beattyville and Jackson. The Kentucky Geological Survey of 1854-1855 notes:[16] "The main coal has been entered in several places near the river above and below Jackson and an extensive business is here carried on in the coal trade which supplies most of the ready cash circulating in the country."

In 1859 there were eight mines in operation near Beattyville and Proctor on the opposite side of the river. The Survey of that year[17] calls attention to the fact that the Kentucky River at certain seasons of the year became a highway along which the coals of Owsley County, then including Lee, were transported to Lexington, Frankfort, and the ports along the Ohio. "The lower member of the mill-stone grit formation is here increased in thickness and goes under water level between the mouth of Contrary Creek and a point three-fourths of a mile above Proctor, thus leaving but a small area along the river from which to mine, though upon the streams to the west of Proctor, especially upon Sturgeon Creek and its tributaries, the outcrops present a wider field. These measures contain four, if not five veins of coal, all of which have been found in the vicinity of Proctor,

Kentucky for the excellence of the coal. This was a cannel, probably from the Haddix bed mined at the mouth of Troublesome. (Kentucky Geological Survey, Bulletin 11, pp. 60-70.)

The mines on Quicksand were located from one to four miles above its mouth, where the "Round Bottom" coal carries at base a superior cannel which was barged to the Kentucky and thence to market. The coal averaged about two feet in thickness. (Kentucky Geological Survey, Bulletin No. 18, pp. 3, 37.)

though but one has as yet received much attention from the miners. This one is known as the 'main coal' and measures from 42 to 50 inches....." Another report of the Survey gives the location of the mines in 1875:

"The lowest coal mines on the Kentucky River are near the mouth of South Fork at Beattyville and Proctor where one of the Sub-conglomerate coals of excellent quality is mined. There are few mines above this for about twenty-five or thirty miles along the river until near the mouth of Holly Creek. Between these places the river runs through the narrows, a gorge or cañon which it has cut through the Conglomerate. For the most of this distance the Sub-conglomerate coals are beneath the level of the river while the hills do not rise sufficiently over the Conglomerate until some distance back from the river to hold the higher coals which have been mined further up. Above Holly Creek banks have been opened every few miles until the last are reached about five miles above Hazard in Perry County. Most of these as already stated are abandoned or have fallen in. .... Back from the river the openings or exposures are few as there is no inducement to mine coal while wood is the most common household fuel in use."[18]

The mining as well as the shipment of coal was in the hands of the farmer who owned the land and operated at such times as he was not engaged in lumbering or tilling the soil. Just before the era of railroads small companies were formed, more extensive tracts of coal lands were purchased, and more labor was employed in each mine.[19] A lack of capital, however, handicapped even the most pretentious enterprises, and the methods of production were almost as crude and haphazard as those applied in the "farmer diggings" of to-day.

At first the coal was obtained from outcrop by a process known as "stripping." Mather in 1838 states[20] that at points on Middle and North Forks the expense of mining was "very trifling" and consisted merely "of prying up so much rock" which was "easily effected." In the commercial openings by

that date, drift mining appears to have been generally adopted, but this newer method was not much of an improvement. Natural drainage and ventilation were depended upon and props were not used so that excavation was continued only to the danger point, and when that was reached the mine was abandoned and another was opened. Many of the tunnels were carried but thirty or forty feet into the hillsides. Most of them were not more than sixty or eighty feet in length and none exceeded a hundred feet.[21]

The Kentucky Geological Survey in 1875 described the methods in vogue at that time:[22] "The practice is to open a drift from which a few boatloads of coal are taken when, as soon as it is far enough underground to render it a matter of some labor to get the coal to the mouth of the drift, it is abandoned and another one is opened. The so-called mines are therefore but a series of shallow pits."

The coal fleet consisted of flatboats propelled by long oars. Sometimes ordinary lumber rafts and canoes were pressed into service. Sandbars or the short natural pools in the stream served as shipyards where the rough boats were constructed of timber from the surrounding forest. There was no provision for storage. The boats loaded directly from the mines during the low water of autumn were tied to await freshets sufficient to carry them over the obstructions in the river. Exposed to sudden and violent rises they frequently broke loose from their moorings and were dashed to pieces on the rocks.[23]

Yet in favorable seasons, the coal industry netted the farmer a considerable profit, and it was in fact the source of most of the money circulating in the region.[A]

[A]David Trimble, in his report to the legislature, February 12, 1838 (House Journal, 1837-1838, p. 468) notes that "any quantity of the coal can be had at the pits at two and a half cents per bushel. It sells at fifteen cents per bushel at Frankfort wholesale, and is supposed by competent judges to be superior to the

For a time some of the coal was sent long distances to market. In 1838 shipments were made to steamboats on the Ohio.[24] Some of this was probably carried down the Mississippi to sugar mills in Louisiana,[A] but Frankfort,[B] Lexington, and

Pittsburg coal for manufacturing purposes." Within the mountains, the coal was sold at Irvine and other points along the river for ten cents a bushel. (House Journal, 1837-1838, Appendix, p. 176.) There are no records of expenses and profits involved in the transactions for the Kentucky River coals, but the following data for mines on the Cumberland in 1837 are probably typical of all commercial mines in eastern Kentucky at that time. (House Journal, 1837-1838, Appendix, p. 131.) The coal was shipped down the upper Cumberland from points seventeen miles or more above Burnside to Nashville, Tennessee, a distance of about 344 miles. The distance from Hazard, the head of coal-boat navigation on the Kentucky, to Frankfort is 285 miles. The expenses on the Kentucky were not so great because of a shorter distance from mine pit to boat and thence to market, but the market price of coal was less.

Disbursements.

One boat load (3,500 bushels)		$315.00
Mining and delivery at mouth of mine (per bushel)	$0.025	
Hauling to landing	.055	
Loading	.005	
Bailing	.005	
Total cost aboard boat	.09	
Boat		140.00
Hands and expenses ($0.35 per mile)		120.00
Total cost at Nashville		575.00

Receipts.

Total value at Nashville, one boat load (3,500 bushels at 23 cents)	805.00
One boat	35.00
Total value	840.00
Net profit per boat	265.00

[A] In 1838 Mather reported: "The amount of coal consumed on the waters of the Ohio and lower Mississippi is very great . . . It is used for domestic fuel, in iron works, steam mills, and various manufacturies, steamboats, and for sugar boiling in Louisiana. The consumption is rapidly increasing in all the various purposes to which coal is applied, but the use for sugar houses and steamboats is going far in advance of the others. Those who have used coal on steamboats and in sugar houses almost invariably prefer it to wood, not only on the score of economy but because it is easily regulated and there is a greater uniformity in the heat . . . ."

It was estimated that at least one million bushels were sent to market annually from the Cumberland, the Big and Little Sandy, Kentucky, and Green Rivers. (Kentucky House Journal, 1838-1839, Appendix, p. 241.)

[B] Under favorable conditions the boats made from four to five miles an hour. A run of about six days was required between Frankfort and Beattyville. Navigation was impossible at night and the first stop-over was at Old Landing, in Lee County, about half-way between Beattyville and Irvine, Estill County.

other points in central Kentucky received most of the cargoes. Since there were no repositories along the river, the coal was dependent for the most part upon chance markets and often its sale was forced.[25]

This fact and the risks of river passage rendered the industry financially so hazardous that, as soon as the means of transportation in central Kentucky were improved, competition with Pennsylvania coal became impossible and shipments were restricted to points not far distant from the coal field.[26] While the completion of the slack-water system by the State would have aided this industry greatly, the partial achievement of the project was a distinct detriment. The works on the lower section of the river provided no outlet for the Kentucky coal but instead facilitated the carriage upstream of products from competing fields.[A] The anomalous results were reported by the Kentucky Geological Survey[27] in 1875:

"There are numerous mines along the Kentucky River where coal has been mined for shipment in boats down the river, but none of these are extensive and the majority are now abandoned and have fallen in . . . . . Of late years,

[A]Soon after the Revolutionary War mines on the Monongahela began to supply towns along the Ohio and Mississippi Rivers with coal. The industry was not extensive, however, until 1850, in which year tug boats were introduced on the rivers, and the condition of traffic was revolutionized. Barges which could now be returned upstream were built stronger and of greater capacity and more frequent rises could be utilized. Since that time the Pennsylvania field has been the chief source of supply for the Ohio-Mississippi Valley from Pittsburgh to New Orleans.

Slack-water on the Monongahela and on the upper Ohio practically obliterated distance as a factor in competition with Kentucky coals. The improvements furnished a safe and commodious harbor at Pittsburgh for storage, which is necessary for the economical transportation of coal where rivers are subject to extremes of high and low water and to ice floes. Such harbors, artificial or natural, are lacking on Kentucky streams, except that at the mouth of the Licking River, which is markedly inefficient. The coal fleet, stored at Pittsburgh in readiness for a favorable rise, could reach not only the Ohio River markets, but those of the Mississippi as soon, if not earlier than the Kentucky boats, for important rises, as a rule, are general throughout the Ohio basin. In 1877 coal was brought from Pittsburgh to Louisville (600 miles) in five days and at a cost of one and three-fourths cents per bushel, including the return of the empty craft. (Saward, Coal Journal, 1877, W. J. Nicolls, The Story of American Coals, 1904.)

owing to the price of coal in the lower markets, coal mining has not been as profitable as formerly and but little is now mined in this region, except of the finer grades of cannel coal which brings a higher price and can, therefore, yet be mined and transported at a profit . . . . . The cause of this stagnation in the mining industry is the excessive cost of transportation due entirely to the uncertainty and danger of river navigation. Coal boats drawing five feet of water can only be run during high water which can be expected but a very small portion of the year. This, therefore, necessitates the storage of large quantities of coal, often for months after it is mined, while waiting for a rise in the river sufficient to carry it off . . . . . In addition to the injury and loss by exposure, an extra cost is involved through the loss of capital lying idle for so long a time. The boats used to carry the coal down the river can never be returned and they are usually sold at great loss. The river is so difficult of navigation that from three to five men are required to manage each boat, or one man to about each thousand bushels of coal, the boats usually holding from three to five thousand bushels of coal each. In addition to these necessary and inevitable expenses, there is great risk involved in the navigation of the river, a large proportion of the boats never reaching their destination. These combined causes make the cost of coal at the markets along the Ohio River so great that Pennsylvania coal is brought down the Ohio River and up the Kentucky and sold at a less price in Frankfort than coal from this region. Thus the work which had been done by the State in improving the navigation of the Kentucky River for a part of its course only, actually operates against the interests of Kentucky coal miners instead of furthering them, for it enables the Pennsylvania coal to compete with them in their own markets without assisting them in any degree. Were the Kentucky slack-watered to the mines, so that coal could be shipped at nearly all seasons of the year and the empty barges returned cheaply, this region could supply coal to the whole of that part of the State bordering the river at prices which would drive all foreign coal from the market; and it could even do a large business on the Ohio River in the fine cannel coals in which it abounds. Until improved means of transportation are furnished this region, either by slack-water or railroad, there can be no extensive and regularly conducted mining enterprises. The fine grade cannel coals will probably continue to be mined in a precarious and haphazard way as they commonly bring a price sufficient to pay a small

profit over the risk and expense of transportation, but with this exception, the great body of coal will remain untouched."

Shipment by rail began immediately upon the completion of the line to Jackson and Beattyville. From that time until the extension of the road up North Fork, the commercial mines were confined to Breathitt and Lee[A] Counties.[28] The territory exploited was practically the same as that of former years, and the methods were but slightly improved so that the output, although increased, was small when compared with the product from other sections of the coal field. It was not until 1913, when Letcher County began to ship by rail, that the Kentucky basin became an important mining center. In that year 1,141,604 tons were produced, valued at $1,429,144.[29]

It is only at the headwaters of the Three Forks that the seams are of sufficient thickness and extent to warrant large undertakings. Here, since the era of railroads, a gradual transfer of mining lands from resident holders to outside capitalists has taken place. Railroad extension has accelerated the consolidation of numerous small holdings into extensive tracts until now most of the valuable land[30] is under the control of corporations by right of ownership, lease, or option.[B] Much capital

[A] In Lee County the mines were all in the vicinity of Beattyville until the Louisville and Atlantic Coal Company, in 1906, constructed a branch line from the railroad at Heidelberg to Ida May, on Duck Fork of Sturgeon Creek, where a number of mines have since been in operation. The seam worked is the "Beattyville" coal of the Conglomerate Measures, which here averages about thirty-five inches in thickness. (Kentucky Geological Survey, Bulletin No. 12, p. 47.)

In Breathitt County the mines were confined to the neighborhood of Jackson until 1903, when the Ohio and Kentucky Railroad was extended from that point up Frozen Creek into Wolfe County. A high grade cannel coal has been mined at a number of openings along the road. (Annual Report, Kentucky Inspector of Mines, 1903-1904, p. 154; *Ibid*, 1911, p. 52.)

The production decreased in Lee County from 94,597 tons in 1905, to 30,152 tons in 1913, and in Breathitt County from 42,355 tons in 1904, to 6,000 tons in 1913. (Reports, Kentucky Inspector of Mines. Mineral Resources of the United States, United States Geological Survey.)

[B] In some instances mineral rights only are sold, while surface rights are retained by the farmer; the best coal land, varying from twenty-five to forty per cent. and more of the area, has been held awaiting the railroad for development. From twenty to eighty per cent. of this is owned outright by the companies. (Eighteenth Biennial Report, Kentucky Bureau of Agriculture, 1908-1909, p. 160.)

has been invested, and the most modern methods introduced. A number of towns have been built which are growing rapidly.[A] Recently the railroads have opened new and larger markets[B] to the field, and production is increasing at a brisk rate.

FOREST PRODUCTS

A magnificent forest of hardwood intermingled with conifers, covered the upper Kentucky basin when the first settlements were made.[C] Hunters had cleared small patches and in

[A]The largest investor is the Consolidation Coal Company which controls 100,000 acres of land in Pike and Letcher Counties, valued at $10,000,000. The town of Jenkins has been built by this company in the Big Sandy Valley, and just over the divide (seven miles) the town of McRoberts, on Boone Fork of the Kentucky. Near the latter town are Hemphill, Fleming, and Haymond on tributaries of Boone Fork, which are the mining centers for the operations of the Elkhorn Mining Corporation, the leasing operators on land owned by the Elkhorn Fuel Company which also controls a vast acreage in this region.

The town of McRoberts is supplied with heat and electricity from a plant in Jenkins where power is obtained by means of a concrete dam across the headwaters of Elkhorn Creek of the Big Sandy. The dam is thirty-five feet high and 280 feet long and provides a reservoir of 75,000,000 gallons capacity from which both circulating and feed water are secured. The utilization of waterpower demonstrates the potential value of mountain streams other than that to be derived from navigation. (See Note B, p. 15.)

Before the railroad era, the mines throughout the mountains were operated exclusively by natives or by negro labor. According to old residents slaves were brought into the region to work in the coal mines and at the salt-works and to navigate the boats. (See Note D, p. 155.) At present much of the mining is accomplished by machinery and the unskilled foreign laborers are increasing in number. (Verhoeff, The Kentucky Mountains, pp. 26-28.)

[B]The market for the coal has heretofore been limited by poor rail connections to the central section of Kentucky. There it had to compete on the north with Pittsburgh Coal from the Ohio, and with the Big Sandy and West Virginia coals brought in by the Chesapeake and Ohio Railroad. To the south, coals from the Cumberland River Valley have been active competitors. Coals from western Kentucky have also supplied a large part of the market. Kentucky is the only one of the coal-producing states which has within its borders sections of two great coal fields. The area of the western field is about half that of the eastern, and the coals in general are inferior, but because of better transportation facilities, up to the close of 1911 the larger part of the production of the State was from that district. In 1912-1913, however, as a result of the extensive developments in Letcher and other counties at the headwaters of the rivers, the eastern district gained the ascendency. Much of the product from the Kentucky basin now goes to the Lake ports and other northern and western markets. (Mineral Resources of the United States, 1913, U. S. Geological Survey, p. 847.)

[C]"The woody plants of Kentucky are a very miscellaneous assemblage of species which appear to have been brought together by a diversity of influences. Probably the mountains in the eastern part of the State furnished most of them,

places the timber had been burnt by the Indians[21] to secure a more vigorous pasturage for buffalo and elk, or to drive out the game[A] but the devastation of the forest began with the settlers. Since the decade 1790-1800, there has been a steady exploitation. At present, the forest consists of scattered tracts on the ridges and slopes, and in the more rocky and narrow valleys.

A government investigation[22] in 1907 and 1908 showed about one and one half million acres in forest with an average stand of over four thousand board feet per acre or six billion feet of standing timber. The best timbered counties were at headwaters where the stand in Letcher County averaged six thousand feet per acre on eighty-one per cent. of the total area,

having constituted a sort of reservoir which overflowed as the land to the westward became habitable. . . . . It looks as if the states immediately north of us had also received many of their forest trees originally from the Appalachian Mountains, the important route of migration having been along the Ohio River. Nearly all of our species of pines are still abundant in the mountains and but one (the scrub pine) has traveled very far to the westward within the State. The red cedar has extended more rapidly and farther than any of the true pines, but appears to have had a similar origin and this seems to be true even of the swamp cypress. . . . This influence of the rivers on the distribution of our species finds a striking illustration in plants regarded as specially characteristic of mountainous country. Some of them grow far westward of the mountains. . . .

"The intermediate position of the State results in the presence of a surprising variety of species. Side by side one finds the northern white pine and the tender magnolias. Added to these characteristically northern and southern plants is a host of individuals representing most of the trees and shrubs of the eastern United States. Taking the oaks as an example: Twenty of the twenty-two species of Eastern Northern America occur in Kentucky. . . .It is probable that every one of the ashes occurs in the State. . . Every one of the five East American elms grow in Kentucky. . . . ." (The Woody Plants of Kentucky, by H. Garman, Kentucky Agricultural Experiment Station, Bulletin 169, pp. 7-8.)

[A]Doctor Walker, in 1750, probably on the waters of Station Camp in Jackson County, notes: "The woods have been burnt some years past and are now very thin, the timber being almost killed." (Johnston, First Explorations, p. 60.) Traveling "due east" up the West Fork of Red River, he again notes: "The woods are burnt fresh about here and are the only fresh burnt woods we have seen these six weeks." (*Ibid*, p. 69.) Indian and white man alike used the barbarous method of fire-hunting, especially in procuring deer. The Virginia Assembly in 1738, passed a law for the "better preservation of the breed of deer." The preamble to the act reads in part: ". . . . and it is also found by experience, that the making large circles and setting the same on fire round the coverts where the deer usually lodge called fire-hunting is not only destructive to the breed of deer but also to the young timber and food of the cattle. . . . ." (Littell, Vol. II, p. 554.)

and in Leslie and Perry Counties, five thousand feet on eighty per cent. of the area. In contrast, in the lower counties of Estill, Lee, Powell, and Wolfe, the stand was from between 1,400 and 2,600 feet on from seventy-one to fifty-six per cent. of the area.

The virgin stands, which occur only on a few scattered tracts kept intact by various companies, show an average of over ten thousand feet per acre so that more than one half the timber has been removed from the forest.

The different species occur throughout the region and the trees are of uneven size and age.[A] Nearly one-third of the growth[11] is white oak, the most important tree commercially. Chestnut oak, of which there is about one half the quantity, ranks second and these together with the beech and chestnut make up about seventy per cent. of the forest. In the virgin forest, yellow poplar ranked second and walnut was much more

[A] A certain grouping of species governed by soil conditions has been noted. In the rich bottom lands trees characteristic of fertile and moist soils are abundant, such as maple, sycamore, elms, willow, beech. On the talus accumulations at the base of the hills rich land growths predominate such as white oak, beech, walnut, yellow poplar, white and shag hickory. As the upper slopes and ridges are approached these are gradually replaced by the chestnut, chestnut oak, black hickory, and pines.

It appears that moisture, temperature, means of dispersal, and configuration of surface, control the distribution of trees more than the chemical composition of the soil. A change in geological formation, however, is in places accompanied by a sudden change in species. In the Pine Mountain escarpment the Keokuk limestone (Waverly) outcrop bears a magnificent forest of rich land timber in contrast to poor land species on the infertile Devonian shales, and on the terraces of Newman limestone in the lower counties bottom land timber is found 225 feet above drainage. (LaFayette H. DeFriese, Report on a Belt of Kentucky Timbers, extending east and west along the South Central part of the State from Columbus to Pound Gap, Kentucky Geological Survey, New Series, Report on Timbers, Vol. B, p. 37, Table 10, p. 45.)

Altitude and exposure also affect but slightly the forest growth. In general, the coves and hills of northern exposure protected from the southwest storms have a deep and moist soil and there the timber is of better quality than that of the upper ridge lands where the trees have less vitality due to exposed situation and thin soil. On many uplands, nevertheless, a deep, rich soil sustains a forest in its greatest development. The only extensive area of poor timber is in the Pine Mountain ridge where a massive forest growth cannot hold in the thin soil and there is an assemblage of stunted trees whose roots spread out on the surface. (*Ibid*, Report on the Timbers of North Cumberland, Bell and Harlan Counties, p. 5.)

abundant but the valuable trees of these species have been removed.[A] In the lower counties white oak has also been extensively cut and black oak and hickories are of greater relative importance.[B]

Locally, the timber has been consumed not only for buildings and fuel, but by the various industries. The Red River iron works, between 1808 and 1875, completely deforested sections of Powell and Estill Counties. A part of this "coaled over" land was used for agriculture, stripped of its soil, and then abandoned

[A] A high grade white oak attains a height of 120 feet and a diameter of five feet; walnut, a height of 110 feet and a diameter of forty inches; yellow poplar, a height of 140 feet and a diameter of eight feet; beech, a height of 100 feet and a diameter of thirty inches.

[B] A number of fruit trees, persimmon, cherry, pawpaw, crab apple, and plum are of wild growth.

Laurel (Kalmia latifolia), rhododendron (Rhododendro maximum), and holly (Illex opaca), form dense thickets upon the rocky sandy soils of the Conglomerate outcrops. The pines are also chiefly confined to that formation. On Pine Mountain there are two belts of pine. Mountain pine (Pinus pungens) and black or pitch pine (Pinus rigida), found on the Conglomerate bluffs and tops, and the yellow or short leaf pine (Pinus echinata) extending further down the slopes. (Kentucky Geological Survey, New Series, Report on Timbers, Vol. B, pp. 7, 37-38.)

The following is a list of the principal species in the basin and their percentage of the total forest in 1908-1909:

White Oak (Quercus alba)	29.9	per cent.
Chestnut Oak (Quercus prinus)	16.5	"
Beech (Fagus atropunicea)	11.9	"
Chestnut (Castanea dentata)	9.2	"
Black Oak (Quercus velutina)	6.8	"
Poplar (Liriodendron tulipiferia)	5.9	"
Hickory (Hicoria, minima, ovata, alba, glabra)	5.6	"
Basswood (Tilia americana, T. heterophylla)	2.7	"
Yellow Pine (Pinus echinata)	2.07	"
Gum (Nyssa sylvatica)	1.9	"
Hemlock (Tsuga canadensis)	1.8	"
Buckeye (Aesculus glabra)	1.05	"
Sycamore (Platanus accidentalis)	.37	"
Cucumber (Magnolia acuminata)	.308	"
Ash (Fraxinus americana)	.303	"
White Pine (Pinus strobus)	.21	"
Birch (Betula nigra, Betula lutea)	.17	"
Walnut (Juglans nigra)	.1	"
Locust (Robinia pseudacacia)	.03	"
Miscellaneous	.22	"

(Biennial Report, Kentucky Bureau of Agriculture, 1908-1909, pp. 39-42; *Ibid*, 1906-1907, pp. 55, 118-120.)

to briars and weeds. A part left to itself again produced merchantable timber and is now in process of exploitation.[35]

The early coal miners utilized little timber except in the construction of barges, but as underground excavation increases large quantities are required for props, caps, rails, and other accessories, so that from now on mining will probably make greater demands[A] upon the forest than any other industry.[36]

The clearing of land for agriculture has wrought the greatest havoc so far. As farms have gradually crept up the hillsides acres of abandoned land have been left in their trail, upon which if trees live at all they are so scattered as to be of little value.[B] Unregulated grazing,[C] which has been the approved method of pasturing stock, has been another prolific cause of forest deterioration. Stock, browsing at will, cause the standing timber to decay at stump, and by consuming seedlings and sprouts, break the soil thus interfering seriously with the conditions favorable to moisture, and reproduction.[37]

The annual "firing" of undergrowth to facilitate the search for mast too often accompanies the grazing, and has been even more disastrous. Extensive areas of woodlands owned by non-residents have been injured in this way by the local farmers. The woods are set on fire in the autumn after the leaves have fallen and growth is dry so that widespread damage results.[38] The protests of the proprietors and even the fire laws[D] which

[A]Throughout the eastern coal field, about four and a half feet of timber are used in the production of one ton of coal. At the maximum annual rate of growth (100 feet per acre), 1,200 acres would be required to furnish a perpetual supply of timber to the average mine of 35,000 tons capacity, which uses 120,000 feet of timber annually, valued at $1,000. (Biennial Report, Kentucky Bureau of Agriculture, 1908-1909, pp. 158-160.)

[B]A typical old-field growth consists of hickory, black oak, locust, pine, sassafras, sourwood, greenbrier, and various shrubs.

[C]The production of oak is especially affected. (See p. 146.) The preference of the squirrel and turkey, as well as swine, for the more palatable acorns of the white oak, favors the increase of black oak and other inferior trees.

[D]As early as February 22, 1834, an act of the legislature to prevent "the setting on fire" of woods in Perry, Clay, and other mountain counties, imposed as

were made especially applicable to this region have been unavailing to stop the abuse.[39]

About 1835 the marketing of forest products began to assume a slight importance, but so long as transportation was entirely by river, which was the case until 1890, the industry did not attain large proportions.[40] The operations were conducted entirely by the farmers who lumbered each on his own wood-lot and manufactured by hand or in primitive sawmills small quantities of the timber into semi-finished articles of commerce characteristic of the region to-day.[41]

Since the beginning of railroad transportation, production has increased annually. A large proportion of the product is still shipped by river but the greater part is sent by rail. The control of the industry has been transferred to outside capitalists, although the farmers still possess most of the land in small holdings and are dependent upon their labor in the woods no less than upon their farms for a living.[A] The "foreigners" by

penalty for such an offense a fine of forty dollars, or for slaves not over thirty-nine stripes. (Acts.)

The practice is gradually ceasing in the lower counties. There the incentive has been removed by the retreat of the forest to such distances from the farm that the range is inaccessible. In the upper counties, public sentiment opposes fire laws and upholds unregulated grazing. Here pasture land is scarce, and the amount of stock is small on account of the limited supply of winter feed, so that damage to a forest by stock and fire is held to be more than offset by the value of the grazing industry. (Biennial Report, Kentucky Bureau of Agriculture, 1906-1907, pp. 108, 110, 112. *Ibid*, 1908-1909, p. 52.)

Fires are also started by the farmer when he "burns off" new ground and when he abandons smouldering "bee trees," "coon trees," and camp fires. The location of the forest upon the ridges separated by cleared lands in the deep valleys is an excellent protection from fires which are not as destructive here as in other parts of the United States. The most disastrous conflagrations now occur at headwaters where the forested areas are most extensive and in the lower counties where some of the ridges broaden out in dry sandy stretches. They occur usually during April and May before the leaves have come out and in October and November after the leaves have fallen. If the woods burn in May before the sap starts to rise many or all of the larger trees are killed.

[A]Few holdings exceed 250 acres, but the timber rights on many of the small tracts have been sold or leased. There are about one hundred holdings of more than 1,000 acres. (U. S. Census, 1910.) In Breathitt, Leslie, Perry, and Letcher Counties, there are tracts of from 30,000 to 50,000 acres, which have been held by companies awaiting transportation for timber as well as coal. Mineral rights, usually include the right to cut and remove the timber required in the mines. (Biennial Report, Kentucky Bureau of Agriculture, 1908-1909, pp. 36, 160.)

whom the farmers are employed as lumbermen, mill-hands, and tie-makers have established well-equipped lumber camps, logging outfits, and logging railroads, so that a large scale industry is now carried on which was impossible in the past.[A]

A number of outside lumbermen have been employed by the various companies but labor in general is recruited from the mountaineers. They have been bred for generations to a knowledge of woodcraft, such as was practiced by their English ancestors. To-day half grown boys, who have from early childhood accompanied their fathers to the woods, can at a glance designate trees with a diameter limit below the standard, tell to the fraction of an inch the size a tie should be hewn, and select an oak tree that will rive free and true into stave billets. Most of them are also skilled navigators who, working waist deep in the winter tide, drive logs and guide rafts in safety to markets miles below.

Much of the manufacture is also left to the native farmer who still accomplishes his work for the most part by hand. In the use of the frow and mall, the broadax, the wedge and whipsaw he is an adept, and with these tools not only produces articles for commerce but builds his house, fashions the furniture, and rives out thousands of cords of pickets for the stake and rider fences characteristic of this region.[B]

[A]The operations of the Eastern Kentucky Hardwood Company are the most extensive. The company owns 42,000 acres of land, from which it supplies five mills near the mouth of Quicksand Creek, Breathitt County.

[B]Churns, washtubs, barrels, and other household accessories, hollowed out with nicety from sections of logs, are found, but these are rapidly disappearing in competition with articles from the outside.

Basket weaving by both men and women is still a thriving industry. The baskets made in old English designs of many sizes are in general use throughout the mountains. Willow slips are preferred for the purpose, and the colors are obtained from walnut and other trees, although analine dyes are now coming into favor. The following description by a housewife of Knott County indicates the economic importance of her handicraft (Annual Report, W. C. T. U. Settlement School, January, 1913):

"The fall is the very best time to get the willers because the sap is down. It will do very well if they are pulled about the time the corn is laid by. You have

The industry as yet is assisted somewhat by antiquated custom sawmills built at the shoals of the streams. Such mills, few in number and usually combined with the grist-mill, are run by the crude water-wheel in winter and by steam during the low water of summer. Here the farmer can saw the wood brought from his own and his neighbor's holdings into rough lumber. Some of this is now hauled ten or twenty miles to the railroads for shipment. The mills have always been of small capacity. At present the maximum output for the most pretentious is not more than five hundred to one thousand feet per day. Many of these structures have been removed or rendered useless in the course of river improvement.[42]

Since the beginning of railroad transportation, three types of mills have been introduced.

The portable circular sawmill predominates. This has a daily capacity of some two thousand board feet of lumber and two hundred ties, or of five thousand feet of lumber alone. Mills

to wait until the young growths begin to come and then you can get them. Willers grows best in creeks and swamps. They are two kinds, the golden, and the brown. You gather 'em first, and lay them up to dry. I lay some up over the fire board. You kin put them on something and put them out in the sun. You dry 'em until they get seasoned and you can tell that by the bark turning red. I wait about a month and a half before I work mine. You take 'em down and put 'em in hot water and scald 'em until they get soft and then take 'em out and work 'em. Scald 'em when they are green if you are going to peel them. Peel them and let the ooze set in the kittle and put the peeled willers out to dry. When you want to color them you put them in the ooze just for a few minutes. This makes gray. Put copperas in the ooze or onion hulls to make it sorter yeller. The pretty greenish gray ones is made by putting in a little copperas. I color some with broom sage root, too, and copperas. You jist put a little pinch of copperas in it. I have been making baskets about ten years. I bought me a cow for twenty-five dollars, a couple of bedsteads and springs for twelve dollars and a half, a cook stove for six dollars and a half, paid off five bank notes for fifty dollars each, bought five barrels of flour, paid a man to put in my crop each year, and everything that my family needed to eat and wear I have paid for with my basket money."

The willow is of no commercial importance, although it is valuable in preventing erosion, so that the profit on baskets is clear gain. Local utilization of timber in many cases has been poor economy, as the most valuable trees have been cut for petty purposes. Mature walnuts worth hundreds of dollars have been sacrificed for fence rails. Hickory poles, six to eight inches in diameter, are at present trimmed out as ax handles at a cost of fifty cents in labor that can be bought for fifteen cents at the country store. The tree allowed to stand, in a few years would be worth one dollar.

of this type follow the retreating forest and are located at scattered points within hauling distance of the railroad.[45]

Band mills, some of them with a capacity of 125,000 feet a day, are located on the main streams at railroad crossings, receiving their materials both by water and rail.[46]

A small number of finished-product mills are located within a short haul of the railroad and where a special character of forest prevails.[46]

The products shipped from the region consist of timber in the rough or sawlogs, and of finished or semi-finished manufactured goods. The annual output is estimated to be over 250,000,000 board feet, valued at $3,800,000, which means about forty dollars for every inhabitant of the district, or $200 for the average family.[46]

Sawlogs, which make up about thirty per cent. of the total output,[47] depend almost entirely upon river transportation. There is an annual shipment of over 80,000,000 feet, or 2,097,300 logs. This part of the industry, carried on for more than three quarters of a century,[A] has now reached its climax, and is be-beginning to decline.

In the early years those species of trees were selected that would float readily, notably walnut, yellow poplar, ash, and hemlock. Splash-dams high on the most inaccessible creeks bear witness to the extent of the cutting. It was not long before the supply of high grade trees was consumed.[B] Then, the

[A]Commercial production began with the shipment of sawlogs. The Census of 1840 ascribes an output of forest products to Clay County valued at $5,235, and to Estill County, an output valued at $2,457.

Logging, however, had begun in the upper counties. In 1835 there were 3,000 logs floated down the Kentucky from the vicinity of the Three Forks (Kentucky Senate Journal, 1835-1836, Appendix, p. 39), and in 1838 there was an estimated annual shipment of 1,000 logs from Middle Fork. The timber was chiefly oak, poplar, and pine. (House Journal, 1838-1839, Appendix, pp. 121-122.)

[B]The Kentucky Geological Survey, in 1878, noted the exhaustion of valuable timber along the river until a point about five miles above Beattyville was reached. Even there, old stand poplar and walnut were scarce, except at the

white and chestnut oaks, which float after long periods of seasoning, were used. Now these trees are showing signs of exhaustion.[48]

In the lower counties, Wolfe, Powell, Estill, and Owsley, all of the commercial timber in the neighborhood of the streams has been cut down and logging has become almost extinct.[49]

At present, Leslie, Perry, and Letcher Counties are the chief sources of supply. The logs, for the most part of high-grade white oak (thirty-eight per cent.) and low-grade poplar (thirty-six per cent.) with small quantities of other species, come from the headwaters of the Three Forks.[50]

Logging commences after the November harvest and continues until the spring planting in March. As a rule the trees are felled with the ax, but often they are "deadened" by girdling, and allowed to stand until they fall of themselves. The bark is peeled and the branches and tops are cut away in the woods. When large and heavy the stems are sawed into lengths. Some dragged to the cliffs are started by cantling hooks and fall by gravity to the creek below. Others are attached in groups of two or three by chains and dragged by mule or steer over rough timber tramways. Frequently they are hauled to the creeks in wagons or by means of antiquated two-wheeled trailers drawn by oxen. On the banks of the stream the logs are branded and piled in "dumps" to await a tide.[A]

The streams from mouth to headwaters are used for floating out the logs during the spring and winter freshets. In small branches which do not afford sufficient depth the water is

heads of the small creeks until Pound Gap was approached. In that section the "ancient forest" stood unharmed by the ax. (Kentucky Geological Survey, New Series, Report on Timbers, B, pp. 31-38.)

[A]The best grade white oak logs are hewn into rectangular shape. This "squared timber" is floated to the railroads and shipped to Quebec, from which point it is marketed abroad as "Canadian oak."

impounded by high splash-dams built of timber and stones. In the pool thus formed the logs are collected to await the opportune moment when the gate is opened or the key wedge of the dam unfastened and the water allowed to rush forth bearing its freight.

On the smaller streams the logs are driven, that is followed with grapling hooks from the bank as they drift singly with the current. When the main stream is reached most of the logs are formed into rafts and guided down by oarsmen. On the Three Forks and Red River only half rafts can navigate. They average sixty feet long and from ten to fifteen feet wide and contain about eight thousand feet of timber. On the main river the proportions are doubled and the rafts average 15,000 to 20,000 feet.

Formerly, both rafts and logs were floated[A] downstream to Frankfort, to Louisville and other Ohio River points. Now since railroads have crossed the upper Kentucky, places within the mountains are the chief markets. Mills upstream divert the timber by means of immense booms built for the purpose.[B] Irvine in Estill County is the most important

[A]The logs, arranged so that their length forms the breadth of the raft, are bound together by means of long poles, held by iron "chain-dogs." There are usually two men to a raft provided with long oars. Each man receives two dollars a day clear of expenses. The rafts average four miles an hour and cannot navigate at night. According to a number of veteran raftsmen, seven and a half days were required for the round trip between Beattyville and Frankfort, five days for the "run" to Frankfort (189 miles), and two and a half days for the return. The journey back was usually afoot.

[B]Under date of March 10, 1915, the Louisville Courier-Journal describes a typical "log run": (March 9) "The Kentucky River at Beattyville shows a twenty-foot rise and logs are rushing by the thousands, but are being caught in the booms.

"The Day booms (at Jackson) are holding splendidly and all this company needs is more men. These they are offering every inducement to obtain. The people are responding heartily, and even preachers, lawyers, bankers, and prominent business men are at work on the booms catching logs. Ten thousand logs had already been caught at eight o'clock to-night The rain continues to pour and the river is still rising.

"An immense quantity of logs piled for miles in Quicksand Fork of Kentucky River, broke up just at dark to-night and at ten o'clock to-night, are passing Jackson at the rate of 15,000 per hour. The logs are running so fast that only

center.[11] Here a large quantity of floated timber is converted into manufactured goods and shipped out by rail, or it is bought by agents of sawmills and sent by towboat to points downstream.[A] Select logs are shipped by rail to Louisville and Cincinnati.[B]

Of the manufactured products cross-ties furnish the only important river traffic, but since at least two million and a half ties, thirty-nine per cent. of all wood manufactured, are produced annually, the traffic is considerable. Trees for high-grade ties are now exhausted except in the upper counties.[12] For low-grade ties, inferior trees can be used for which there is no other demand. On this account their manufacture will probably be continued longer than that of any other forest product.[C]

a small per cent of them can run into the booms. The logs are also running thicker in the main river and this run will be longer continued and more steady than the Quicksand run.

"Several days of rain here (Jackson) and in the mountains at the head of the river has resulted in a twelve-foot rise in the North Fork. Telephone messages from Hazard and other points farther up the river indicate that practically all the logs have been splashed out of the creeks, Big Leatherwood alone, contributing its quota of 15,000 logs. Logs began to reach here to-day and the number continues to increase. . . . . Many of the logs are permitted to pass, but about half are caught in the Swann-Day Company's boom. The booms are in good condition and easily hold 25,000 logs. This company's booms at Beattyville will hold 30,000 logs. All logs which are permitted to pass this point will be caught at Beattyville. A large number of men will work at the booms here all night. It is not expected that the biggest run of logs will be here before midnight."

[A] Clay City, Powell County, on Red River, with two planing mills, a large sawmill, a spoke factory, and several tie yards, is also an important market.

[B] In 1905 the Kentucky Railroad Commission reduced rates on walnut logs and other "woods of value" to those on poplar, oak, and other inferior timber. The report notes:

"The evidence establishes the fact that while in former years the supply of walnut logs was of fair size and good quality, that timber has been cut out until the logs at present available, are of small size and poor in quality and the evidence of one witness based on a recent test goes to show that it now requires seventeen pounds of raw material in walnut to make a square foot of the finished product, whereas of the oak it only requires ten pounds to make a square foot. (Report, Kentucky Railroad Commission, 1906, pp. 112-113.)

[C] The railroads in Kentucky afford a steady market for cross-ties. Upon each mile of road there is an average of from 2,850 to 3,000 ties, or over 10,000,000 in the total mileage. The life of a tie is about seven years, and over amillion and a half are consumed annually for maintenance. (Annual Report, Kentucky Railroad Commission, 1906, p. 111.)

Three sorts of cross-ties are produced. Street railway ties have been manufactured recently in small quantities from the chestnut. Bank ties, for which all species of trees are used, are sold to local mines though small quantities are shipped beyond the mountains. Railroad ties make up the principal part of the output. If high-grade they are made from valuable timber such as walnut, white and chestnut oak. A second grade is manufactured from the less valuable stands such as black oak. In the lower counties beech and sycamore ties bring the same price although for permanent use they must be treated with creosote.

Probably seventy per cent. of the ties are still made by hand in the woods.[83] The trees are felled, cut into lengths, and hewed out with the broadax. For the best grade railway ties only young trees are used and the average is one tree to a tie or at least one tie per cut. Larger trees are used for the inferior grades with two cuts and two ties to a cut.

As a rule hewed ties are manufactured in small lots by the farmers. Occasionally, companies buy the timber on the stump at so much per tie and engage their own labor.

An increasing number of ties are manufactured in the portable sawmills owned by lumber companies. Here, smaller and less perfect trees can be used than in hand-work, and refuse wasted by the farmers is converted into by-products. Yet despite the greater cost of production, hewed ties can compete at a higher price with those made in the mills on account of their superior endurance which is due to the selected timber, and their smoother faces which shed water.

For many years all ties were floated out in the same way as sawlogs because railroad rates were prohibitive. Since these were reduced,[A] railroad shipments have steadily increased but

[A]The Kentucky Railroad Commission, in 1905, reduced the rates on ties, which in some instances had been two and a half times as high as those on

as yet, large quantities of the ties, both hewed and sawed, are transported by water. They are taken to the streams in the summer, branded, and piled along the banks to await the winter tides. In some instances the farmer[A] assumes responsibility for the shipment, but many ties are bought by companies after delivery at navigable stream and "driven" by hired labor to the nearest railroad. Transfer from stream to railroad is usually accomplished by steam derricks known as "tie-horses."

Cooperage stock contributes somewhat to river commerce though it forms not more than six per cent. of all forest products.[64] The manufacture of staves is of comparatively short duration in any section since it is based on the oak and disappears with the exhaustion of that tree. The industry no longer exists in the lower counties of Estill and Powell, but is just beginning to assume importance in Perry, Knott, Letcher, and Leslie, and is at its height in the intervening counties.

Split staves are made by the farmers, usually in small lots, after the more valuable timber on their holdings has been marketed as sawlogs. Sometimes the farmers are employed by lumber companies to perform this work on extensive tracts of land. The trees are felled, sawed across into stave lengths, and the circular faces marked off. The logs are then split into billets, which by means of the hearting-ax are chopped out from the sap-wood which is left as a round block. Billets are split

low-grade lumber, a much more valuable commodity. The producer had thus been forced to sell to the railroad, or ship by water. (Annual Report, Kentucky Railroad Commission, 1906, p. 111.)

[A]The industry has been a boon to the farmers. Some of them "follow" tie-making as a business. These men receive twelve and one-half to fifteen cents a tie for their labor which consists in making the ties and sliding or snaking them to navigable stream or wagon road. When this part of the work is done by the owner of the timber a considerable profit is realized, especially when transportation is by water. Hauling to the railroad, which costs about two cents per mile, reduces the profit. A haul of twenty miles for twelve first-class ties, all that is possible for the average team, costs twenty-four cents per tie, or four dollars and eighty cents for a load worth seven dollars and eighty cents at the railroad.

from the bolts by means of the wedge or frow and mall, and dressed, that is, hollowed out and trimmed into shape, by means of the draw-knife, or by the bucker, a machine run by horse-power or steam. When finished, the staves are stacked in piles or ricks for about three months of seasoning before shipment. In some cases the undressed billets are floated or hauled to mills and there prepared for market by machinery.

There are now stave-mills in which the entire process is performed by machinery. The staves are inferior to the hand-made product since the trees are not so carefully selected but the waste is greatly reduced. The mill can produce half as many more staves from the average tree than the farmer who leaves much of the wood to rot in the forest.[A] The mills also use the refuse, the culls and cut-offs, to make staves for lard tiers and kegs. Besides the staves, they manufacture headings for oil and paint kegs from the less valuable white oaks and chestnut oaks.[55] The hand-made staves are used chiefly by manufacturers of liquor for kegs and barrels and require the best grade of white oak.[B] Often fifty per cent. of the oak timber on a farmer's holding is not of sufficiently high grade for the purpose.[C]

Each year a larger number of staves are shipped by rail. When this method is too expensive the billets are hauled to the

[A]Notwithstanding the waste, much of which is due to slips of the frow, the profits to the farmer are high. Split staves of average length, twenty-six to fifty-four inches, delivered at creek or railroad bring from twenty-five to seventy-five dollars per thousand. Unusual lengths of twelve additional feet sell for one dollar and sixty-five cents each. The cost of the staves, exclusive of stumpage but including haulage, averages ten to thirty dollars per thousand. The cost of sawn staves is less, but these bring but forty dollars per thousand delivered at the railroad. (Biennial Report, Kentucky Bureau of Agriculture, 1906-1907, p. 99.)

[B]Whiskey staves must be clear of sap one inch on heart, and they average a thirty-six-inch length and four-inch breadth.

[C]For whiskey staves trees are selected with a clear length of more than twenty feet. The high-grade stave tree has a twenty-eight-foot clear length, and a diameter of over twenty inches inside the bark. Frequently whole trees are discarded after they are cut because of worm holes. (Biennial Report, Kentucky Bureau of Agriculture, 1906-1907, p. 98.)

steep cliffs and cast down the "shoots" to be piled along the banks and branded before they are allowed to drift downstream.

All other forest products depend upon the railroad for transportation.

The farmers ship long unshaven shingles an inch thick and three feet long which they have cut with the frow during the winter from small and inferior trees. These are used locally for roofing and only the surplus is shipped away. Squared billets are split from hickory stumps and sent to the mills at Clay City where they are finished into spokes and shipped to wagon and automobile factories.[A] The straight grained old-stand trees are used for the purpose.[B] The culls and cut-offs are worked by the farmer into bolts and billets for ax handles. The farmers also ship poles, posts, and cordwood by rail.[56]

The stripping of trees for tanbark has become an important industry in all districts accessible to railroads. Formerly only the chestnut oak was used, but now the hemlock and chestnut trees are in demand for the preparation of an extract which is displacing the antiquated tanbark pits. All grades and sizes of chestnut above five inches in diameter are used, as well as the limbs and tops even of wormy and defective trees. Tanbark trees are practically confined to ridges and slopes and are now approaching exhaustion[57] in the lower counties.[C]

The trees are sometimes peeled while standing. The bark is collected in piles, loaded on sleds, and dragged to wagon roads to be hauled to the trains. The stripped trees formerly left to

[A]Three men can split from 1,000 to 2,000 spoke billets in a day which, delivered at the railroad, bring from ten to twelve dollars per thousand.

[B]Green hickory will not float and dry hickory is subject to attacks by insects which destroy its market value, so that much of the timber away from the railroads is still standing.

[C]The headstreams of the Three Forks penetrate a heavy growth of hemlock, which is the characteristic growth of ravines and precipitous slopes. It requires a dry soil and grows about fifty feet above local drainage. (Kentucky Geological Survey, New Series, Report on Timbers, B, p. 16.)

waste in the woods, are now utilized by portable sawmills. The production of tanbark in many instances has become a by-industry of the manufacture of sawlogs and lumber.

The principal product shipped by rail consists of rough lumber, scantling board lathes and other semi-finished material for buildings. It is manufactured in the portable and large band mills chiefly of white oak and poplar. Large quantities of chestnut oak and yellow pine are also used as well as small amounts of all the different sorts of trees. In some instances the companies have built logging railroads up the creek valleys and the logs are transferred by cranes from dumps on the hillsides to the cars. With the exception of the felling of the timber and the snaking of it to the cliffs the lumbering operations are performed by machinery and the transportation from forest to mill and thence to market is entirely by rail. As the mills follow the railroads upstream the manufacture of rough lumber increases. Now it forms more than twenty-one per cent. of the total forest yield.[68]

The dependence of the growth of the lumbering industry upon the increase in railroad facilities is not difficult to understand. Railroad transportation, while expensive, is safe and rapid. River conditions render transportation by water just the reverse. The rises are of such short duration that the shoals and sandbars invariably detain portions of the cargo shipped, and sometimes cause a total loss. Logs may be tied up for several years during long seasons of drought, or carried past their destination by unexpected floods. Under normal conditions a ten per cent. waste must be allowed for, due to weathering,[A] discoloration, and loss of timber.[69] During unfavorable

[A] A poplar log detained in a stream during the warm months of summer blackens and decays, the deterioration lessening the value twenty-five to thirty-three per cent.

seasons the mills which rely on water transportation alone are often forced to shut down. The plants deteriorate from disuse and the labor thrown out of employment, disperses.[A]

The slack-water improvements have added to these difficulties. Each new lock has meant an obstacle[B] to be overcome,

[A]The following extracts from the Louisville Courier-Journal of 1905 indicate the risk involved in river shipments: (February 14.) "The ice gorge in the Kentucky River continues. The mercury fell to zero Sunday night, causing the river to begin freezing with a thirty-foot rise below Jackson, and logs and ice are now packed tighter than ever. The worst part of the gorge is below Beattyville, about two miles and extends clear into Irvine, Estill County, a distance of thirty miles. There, in various places, ice is stacked to a height of from twelve to twenty feet. Surrounding these are piles of the finest walnut, poplar, and oak logs, while in the center for miles fifty-foot logs have been turned on end, and are standing that way in the water. A careful estimate by a riverman holds that the loss already sustained by the Swann-Day Mill Company, and the Swann-Brabb Mill will reach one half million dollars, and 200,000 logs are now in the water, ruined and ground to pieces in the jam.

"The cold snap is causing much concern today, as men can hardly stand the strain of standing in the river on booms for twelve hours at a stretch, and many are quitting the work rather than freeze.

"The efforts to dynamite and clear the gorge have so far been fruitless, the huge explosives having no more effect on the ice than a giant fire cracker.

"The heaviest loss by the ice gorge will fall upon the log men of the extreme mountain counties, whose timber has been lying for two years in the valleys waiting for a tide. These men have no other way to earn a living, and with their timbers buried in the rivers, their entire labor of three years past has been swept away."

(February 14.) "It is impossible to accurately estimate the number of logs floating down the Kentucky River, but there are possibly more than 100,000. The Kentucky River Poplar Company of this place (Irvine) had stretched wire ropes across the river, and for a time it seemed that they would be successful in stopping the logs, but the pressure became too strong and about 2:30 o'clock this afternoon the ropes broke and the logs began to float downstream. The rise is about ten feet high, and is a solid mass from shore to shore. The logs continued to come down for about two and a half hours. The loss to this section is large. It is hoped that when the logs reach slack-water many of them can be saved, although it is a certainty that more will be lost on account of the crush. The ice gorge at this place has entirely disappeared."

(February 16.) "The gorge between Ford and Irvine is thirty-six miles long, and contains 300,000 logs. Booms have been strengthened by heavy chains and wire cables, and no damage will occur unless warm rains come and weaken the ice. More than $500 has been spent in dynamiting Kentucky River ice gorges."

[B]When the locks are closed for repair, heavy losses are often incurred. The ice and freshets during the winter of 1905 caused in the spring a washout at Lock Number 10, the results of which are noted in the Louisville Evening Post of March fourteenth:

"The conditions here (Ford) continue serious. The town is full of timbermen and logmen, who started out from above last week with rafts principally for Frankfort and points beyond, but found on reaching this point they could go no farther, on account of the conditions at the lock. For about seven miles above Ford, rafts of logs line both sides of the river. It is estimated that there are tied up here about 500 rafts, aggregating about 40,000 logs. The holders are complaining bitterly, and the Government engineers that drew the plans and specifications of the dam are being severely criticized."

and an additional delay and damage to the cargoes. Since loose timber has been prohibited from slack-water, moreover, the rafting and towing of logs has increased the expense of shipments and this in turn has been disastrous to downstream timber markets, such as Valley View and Ford, situated at railroad crossings of the river and formerly transshipping points. Some of their largest mills have either gone out of business or have transferred operations upstream to the lumber region."

The slack-water system thus acts as a tariff to encourage home manufacture and the marketing by rail of commodities less in weight and higher in value than logs and ties. Logging and tie-making are the only mountain industries which would have been hindered rather than benefited had the State extended slack-water to Beattyville, for it is likely that the mills, which have followed the railroads, would have preceded them and shipped their products down the river.

The delay in the exploitation of the forest until the railroad era has proved financially an advantage rather than an injury since timber values have increased steadily. The day is approaching, however, when the present forest will cease to yield an income to the farmer, for manufacture is hastening its destruction. Cutting is now proceeding at a rate twice as great as reproduction. If it continues, all marketable timber will be consumed within a few decades and the industries based upon the forest will die. Lumbering whether carried on by the farmers or outsiders is conducted without reference to future productivity. Young growth is ruthlessly crushed and killed and the woods are left with much of the ground hardened or gullied or covered with great piles of slash. The best stands, moreover, are removed and reproduction is left to inferior species and defective trees.

The despoilation of a forest is only justified when, as in the Bluegrass, the land is made to yield an abundant living to the community. This has not been the case in the mountains where the devastation has meant destruction of soil over extensive areas. The region is a natural nursery[A] for timber and could be rendered a permanent source of wealth by scientific treatment.[B] Probably sixty per cent. of the land could yield a greater revenue from a forest than from any other product.[61] This fact is now becoming apparent to the mountain people, but improved methods are being introduced so late that the greater part of the existing forest cannot be saved and the benefits will accrue to future generations rather than to the present land owners.[C] The individual farmer finds conservation impracticable because of the smallness of his holdings and his lack of capital. In many cases he has transferred his timber rights to mineral and lumber

[A]See p. 182, Note C.

[B]"The average virgin forest is wasteful as a source of lumber and of fuel. It is only here and there that a tree is found of proper growth and suitable species for first-class material. As a lumber producer a forest of this kind is analagous to a cornfield planted in scattering hills here and yonder, instead of being cultivated throughout its extent and planted with that regularity and closeness of spacing that will produce the maximum yield. If the expense is not found to be too great, in comparison with the return, forests should be cultivated with the same care both as to species and as to distribution, and possibly, too, as to rotation, that the intelligent farmer uses in planting his fields. In this way returns equal to what we now get could be secured from a much smaller forested area." (W. L. Moore, A Report on the Influence of Forests on Climate and on Floods, to the House of Representatives, United States Committee on Agriculture, p. 4, Washington, 1910.)

[C]Where artificial factors are lacking there is reproduction in kind. The rate of growth averages fifty to one hundred board feet per annum and a period of from twenty-three to twenty-five years is required to reproduce a given density of stand. "As a general proposition the raising of lumber or timber by an individual is out of the question on account of the length of time which it takes to grow the better grades of this material. Ordinarily, a tree fifty years old will furnish only the poorest grades of lumber and usually only small dimension stock. Generally speaking, one hundred years is not too small a calculation for the length of rotation when lumber is the aim. In the event that any individual plants trees for the production of lumber such planting is done as an investment purely and simply, since he cannot expect to see the crop harvested within his lifetime. The only monetary benefit that could possibly accrue to the owner is from the material which may have to be thinned out, or in the event that he should desire to sell his farm when the existence of a grove or woodland of healthy young trees would represent an actual money value to the purchaser." (Biennial Report of State Forester, 1913, p. 97.)

companies. Fortunately the corporations are awakening to the advantages of forestry. They have begun to replant cut-over land and to exercise a proper control of existing stands." A government reserve[A] soon to be established at headwaters" will do much to assist conservation, and the State supervision now in force will be even more effective.

Until railroads penetrated eastern Kentucky, there was scant attention given by the State to the region as a forest. The first official investigation was made by the Geological Survey between 1875 and 1880. A general idea of the kind and quality of stand was obtained and stress was laid on the enhanced value of the timber which would arise in the future."

Notwithstanding this timely warning, twenty-five years elapsed before there was action in regard to conservation. In 1906, the legislature" added to the State Board of Agriculture, a department of forestry with an annual appropriation. In

[A] A federal law makes impossible the acquirement of land for forest reserves except as an aid to the navigation of streams, and the limited acreage available because of private ownership of the land renders the effect on streams incidental. A report of the United States Secretary of Agriculture to Congress (Report on the Southern Appalachian and White Mountain Watersheds), submitted in 1908, recommended a reserve in the southern Appalachians of not more than five million acres. Of 1,623,000 acres to be purchased in eastern Kentucky, 156,000 were to be entirely within the Kentucky River basin. The object of the reserve was the regulation and conservation of water supply and the flow of streams in the interest of agriculture, water-power, and navigation. Under the Weeks law of March 1, 1911, eight million dollars appropriated for these purposes have been expended in the Appalachians. An act permitting the government to purchase land in Kentucky was not passed by the legislature until March, 1914, after the expiration of the time limit for purchase.

During the summer of 1915, lands in Kentucky were examined by federal authorities and approximately 500,000 acres recommended for purchase, but additional appropriations by Congress are necessary for the purpose. One of the tracts included the Pine Mountain region—the Pine Mountain fault, and a part of the Harlan County Pine Mountains (Cumberland basin), all of Leslie, and sections of Letcher and Clay Counties in the Kentucky basin. As soon as the ownership of the land is assured to the government, an administrative force will be installed including a supervisor and rangers. A system of fire patrol will be arranged and roads and trails will be established whereby the forest may be made available to the public as on the western reserves. Twenty-five per cent. of the revenues from the national forest goes to the county in which it is located for maintenance of roads and schools. An additional ten per cent. is spent directly by the government for roads within the reserve. (Biennial Report, the State Forester of Kentucky, 1915.)

1907, this Board asked and received the co-operation of the Federal Forest Service which appropriated two thousand dollars to the State work.

Since that time, there has been in progress a study of forest conditions throughout the State,[B] and a policy of conservation has been adopted under the direction of a technically trained and experienced forester and a forestry commission.[A] The main objects sought are three-fold: a State reserve of land more valuable for forest purposes than any other, to be acquired by gift, delinquent taxes, or purchase; the establishment of experimental stations on State land or in co-operation with private land owners; the maintenance of a fire warden system with the State Forester as chief to foster public sentiment against fire and to police the reserve.[B]

As a forest reserve this part of the Kentucky basin in its relation to the river has many possibilities. Here, where the annual rainfall is heaviest, no other crop but timber will keep the soil in place on the steep slopes.[C] Lumbering like agricul-

[A]An act of the Kentucky legislature, approved March 19, 1911, provided for the establishment of a State Board of Forestry, prescribing its duties, and for the conservation of the forests and water supply of the State, appropriating $15,000 per annum for the purpose. (Acts of Kentucky, Chapter 133.) The Weeks law passed by Congress in 1911, authorized the United States Secretary of Agriculture to co-operate with the states in the protection from fire of forests at the headwaters of navigable streams and an appropriation was made available for such assistance, the State and Federal Government to share equally in the expenses. Since 1913 (inclusive) a portion of the State appropriation has been expended in such co-operation. (Biennial Report, The State Forester of Kentucky, 1913, 1915.)

[B]Taxation in the past has been comparatively low and therefore favorable to conservation. The new tax system now proposed for Kentucky incorporates the Pennsylvania system calling for the taxation of the land separately from the forest crop. "Given adequate forest protection and a system of forest taxation, wherein the taxes may be definitely calculated for a period of years both on land and crop and where the burden of taxation will fall on the crop at the time of maturity, and scientific forestry may be safely practiced and reforestation and afforestation of suitable areas will be undertaken. Without either or both of the basic premises, the practice of scientific forestry becomes more or less a gamble unsuitable for a long-time investment," etc. (First Biennial Report, The State Forester of Kentucky, 1913, p. 43.)

[C]Professor J. Russell Smith, of the University of Pennsylvania, regards as an "economic crime" the exploitation of the southern Appalachians by a level-land agricultural system. He suggests that a tree agriculture be substituted, having

ture, therefore, has increased the amount of debris carried downstream to choke up the locks and in many ways to interfere with navigation.

Vast acres of land which have been deforested, cultivated, and abandoned are now a prolific source of this waste, and producing no revenue, are a burden to the owners. By planting trees on such land, especially where the streams are wearing away their banks most rapidly, and by conserving the existing forest, the disastrous results of a reckless exploitation by farmer and lumberman can be mitigated to a considerable extent. For the prevention of erosion, and perhaps, too, as a factor in stream control[A] the forest will be a necessary adjunct to a system of

as the main object the production of fruits and nuts as forage for livestock. The sale of timber would be of secondary importance. The success of this system in the mountains of Corsica and Portugal where the natural conditions are less favorable, indicates that the productive area of the Appalachians might in this way be doubled. Experimentation is required to determine the varieties best adapted to local conditions but the mulberry, persimmon, honey locust, and oaks, all of which thrive in the Kentucky mountains, are recommended as possibilities. Plant breeding is constantly making the scheme more practical, reducing the gap between seed time and harvest and producing varieties which are proof against blight. Experiments in the State nurseries at Louisville and Frankfort with this end in view, would be of great assistance to the mountain farmer. It is promised that the adoption of this system would add to agricultural wealth, prevent soil erosion, increase the wood supply, and influence stream control and water supply. (See J. Russell Smith, The Oak Tree and Man's Environment, The Geographical Review, January, 1916, pp. 3-19. Farming Appalachia, Review of Reviews, March, 1916.)

[A] All authorities recognize the forest as a beneficent factor in the prevention of erosion, but the influence of forestation upon stream flow has been the subject of a prolonged controversy which is still in progress. It has been shown that the run-off on some rivers is not materially affected by the forest or any other factor than the precipitation, while on other streams the opposite is true. Compared to the total area of a watershed that of the headwaters is usually so small that the run-off would be insufficient to cause floods on the main river even if deforestation allowed a greater and quicker discharge. (Willis L. Moore, A Report on the influence of forest on Climate and on Floods, Washington, 1910.) The mountain watersheds of the Kentucky form such a large part of the basin and receive such a large share of the total rainfall (see p. 11) that afforestation would doubtless be beneficial to stream flow. That the forest would not perceptibly mitigate floods, however, can be inferred from the intensity of the rises during the period when the mountains were for the most part covered with trees. (See p. 10, Note B. For a full discussion of the influence of forestation upon navigation and floods, see the Preliminary Report of the National Waterways Commission, Senate Document No. 301, 61st Congress, 2nd Session, Washington, 1910; the Final Report, Senate Document No. 469, 62nd Congress, 2nd Session, Washington, 1912; a Review of the Final Report, by Robert M. Brown, Annals of the Association of American Geographers, Vol. III, pp. 88-92.)

reservoirs, should that method of river improvement be adopted in the future. Van Hise, the geologist[17] says:

"While a forest will restrain the movement of water and will hold back for a long time an amount up to its absorptive capacity, this is not unlimited in quantity. And even when there is flood precipitation in excess of the absorptive power of the forest, it will still act as a restraining influence and distribute the excess through a short time. Even a delay of hours is of utmost importance so far as flood damages are concerned, but it is not adequate to maintain a nearly uniform flow. Hence it is necessary to supplement forests by reservoirs at the headwaters of the streams, which will store and hold the excess of storm waters until they can be utilized. This is one of the great improvements now before our people."

CONCLUSION

The Kentucky is one of five rivers the upper basins of which make up the eastern coal field of the State. Here the economic life of each basin, although a distinct unit, has been similar to that of its neighbors. In all of them the people have made strenuous efforts to ship their products by river and, until the railroad era, canalization of the main streams would have been of inestimable value to them. A decline of the salt and iron industries throughout the region was inevitable but everywhere, as on the Kentucky, the manufacturers would have profited by adequate means of transportation during the years of maximum production. The more permanent industries would have been greatly stimulated. As a result the mountaineers would have been brought into touch with advancing civilization and have progressed with the rest of the State. Instead they were left alone to lead the primitive life of their forefathers and the State has suffered from the evils incidental to their isolation and poverty. Railroads at last came to the rescue bringing opportunities for educative and remunerative employment, introducing better methods, modern machinery and implements.

If Kentucky had studied her mountain people and realized their great need she would not have shown such partiality to the rich and populous sections in the disbursements of funds for internal improvement.[68] The contrast between the expenditures on the lower Kentucky and the paltry sums alloted to the mountain streams is an arraignment of the State. Where the government has attempted to make amends for its neglect, on the Big Sandy as on the Kentucky, the improvements have come too late and the money has been spent in vain. To-day, the transportation need is no longer for improved streams but for well made roads leading to railway stations. The State is awakening to this fact and is now giving its long delayed assistance.

It is possible that in the future the demands of commerce may be such that the mountain tributaries of the Kentucky will form connecting links in a vast system of improved waterways such as was considered practicable before the day of railroads. Until then the problem of navigating these waters will be of less concern to the people of the State than the related ones of the prevention of stream pollution and flood damage, and the conservation of water-power, soil, and forest.

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APPENDIX

TABLE I

The area and population in 1910, of counties contiguous to the Kentucky River.

Bluegrass Counties	Area Square Miles	Population
Carroll	198	8,110
Henry	303	13,716
Owen	367	14,248
Franklin	199	21,135
Scott	289	16,956
Woodford	195	12,571
Fayette	269	47,715
Jessamine	172	12,613
Clark	265	17,987
Madison	446	26,951
Garrard	237	11,894
Anderson	201	10,146
Mercer	253	14,063
Total	3,394	228,105

(Small sections of Grant, Boyle, Gallatin, and Shelby Counties.)

Mountain Counties		
Breathitt	483	17,540
Clay	478	17,789
Estill	254	12,273
Knott	348	10,791
Lee	199	9,531
Leslie	373	8,976
Letcher	355	10,623
Owsley	216	7,979
Perry	335	11,255
Powell	181	6,268
Wolfe	230	9,864
Total	3,118	122,529

(Small sections of Jackson and Menefee Counties.)

TABLE II

Tables of Distances on the Kentucky River and the Three Forks, compiled under the direction of the Chief of Engineers, United States Army, by R. R. Jones, Chief Assistant, United States Engineer's Office, First District, Cincinnati, Ohio, 1916.

Table of distances and location of locks, Kentucky River.

Lock No.	Name of Place	From Ohio River	Lock No.	Name of Place	From Ohio River
		Miles			*Miles*
	Carrollton, Ky	0.0		Big Hickman Creek	135.0
1	Carrollton, lock	4.0	8	Little Hickman, lock	139.2
	Worthville	10.6		Sugar Creek	141.5
	Eagle Creek	11.0		Paint Lick Creek	145.0
	Gratz	29.6		Silver Creek	149.0
2	Lockport, lock	31.0	9	Valley View, lock	157.0
	Lockport, Ky	31.0		Valley View, Ky	157.4
	Severn Creek	36.0		Tates Creek	157.5
	Cedar Creek	41.6		Raven Run	165.0
	Monterey	41.6		Lower Howard Creek	173.0
3	Gest, lock	42.0	10	Red House, lock	176.5
	Flat Creek	48.5		Otter Creek	177.5
	Elkhorn Creek	52.0		Ford	177.6
4	Frankfort, lock	65.0		Four-Mile Creek	180.0
	Benson Creek	65.5		Muddy Creek	184.0
	Frankfort, Ky	66.0		Upper Howard Creek	186.0
	Glenns Creek	71.5		Red River	191.0
	Clifton	79.0	11	College Hill, lock	200.0
5	Tyrone, lock	82.2		Drowning Creek	204.0
	Tyrone, Ky	84.5		Irvine	217.5
	Gilberts Creek	89.0		Station Camp Creek	218.0
	Clear Creek	95.5	12	Irvine, lock	220.5
6	Salvisa, lock	96.2		Millers Creek	226.0
	Shawnee Run	106.5	13	Thirteen, lock	239.5
	Brooklyn	112.0		Sturgeon Creek	248.4
7	High Bridge, lock	117.0		Heidelberg	248.4
	High Bridge, Ky	118.4	14	Heidelberg, lock	248.5
	Dicks River	118.7		Beattyville	255.0
	Jessamine Creek	126.0		Middle Fork	258.0
	Camp Nelson	134.9		Head of Kentucky Basin	410.0

Appendix

Distances on forks of Kentucky River

NORTH FORK

Name of Place	From Beattyville	Name of Place	From Beattyville
	Miles		*Miles*
Beattyville	0.0	Lots Creek	83.5
Middle Fork	3.0	Hazard	96.0
Walker Creek	5.0	Carrs Creek	103.0
Frozen Creek	31.0	Leatherwood Creek	113.0
Caney Creek	39.0	Rockhouse Creek	121.5
Jackson	46.0	Whitesburg	137.0
Quicksand Creek	47.5	Boone Fork	147.0
Troublesome Creek	52.0	Head of North Fork	155.0

SOUTH FORK

Beattyville	0.0	Red Bird Creek	43.0
Booneville	10.0	Goose Creek	43.0
Sextons Creek	26.0	Manchester	58.0
Buffalo Creek	31.0	Head of South Fork	77.0
Bullskin Creek	42.6		

MIDDLE FORK

Name of Place	From North Fork	Name of Place	From North Fork
	Miles		*Miles*
North Fork	0.0	Greasy Creek	74.0
Crockettsville	31.0	Beech Fork	78.5
Cutshin Creek	59.5	Head of Middle Fork Basin	93.2
Hyden	65.0		

TABLE III

Location, date of opening, and cost of locks and dams on the Kentucky River.

		Miles From Mouth	Opened to Navigation	DIMENSIONS IN THE CLEAR			Depth of Low Water on Lower Mitre Sill	Cost
				Width (feet)	Length (feet)	Lift (feet) at Low Water		
1	4 miles above Carrollton	4	1882 (State 1842)	38	145	21.2	6 feet	$220,300.17
2	Lockport	31	1882 (State 1840)	38	145	13.9	6 feet	151,983.01
3	Gest	42	1882 (State 1840)	38	145	12.5	6 feet	135,875.54
4	1.5 miles below Frankfort	65	1882 (State 1840)	38	145	13.9	6 feet	131,607.96
5	3 miles below Tyrone	82.2	1886 (State 1842)	38	145	14.5	6 feet	137,436.85
6	3 miles from Salvisa (Warwick)	96.2	1891	52	147	14.4	6 feet	314,864.70
7	1.5 miles below Highbridge	117	1897	52	146	15.3	6 feet	290,768.44
8	4 miles above Hickman Creek	139.2	1900	52	148	18	6 feet	275,463.14
9	.5 miles below Valley View	157	1903	52	148	18	6 feet	237,645.75
10	1.5 miles below Ford	176.5	1905	52	148	17 mov. crest.	6 feet	221,499.58
11	1.5 miles north of College Hill	200	1906	52	148	18 " "	6 feet	296,593.95
12	2 miles above Irvine	220.5	1910	52	148	18 " "	6 feet	425,693.33
13	Thirteen	239.5	1914	52	148	18 " "	6 feet	460,365.86
14	Heidelberg	248.5	Under construction.	52	148	18 " "	6 feet	----------

The data are from the reports of the Kentucky Board of Internal Improvement and the Chief of Engineers, U. S. A. See also, "The Improvement of Rivers Treatise on the methods employed for improving streams for open navigation and navigation by means of locks and dams," B. F. Thomas and D. A. Watt, Vol. I, p. 692, Table, 1913.

Appendix

Tables from the Report of the Chief of Engineers, United States Army, to the Secretary of War for the year 1879 exhibiting information obtained relative to the establishment of slack-water on the Kentucky River and the Three Forks. Compiled by F. W. Fitzhugh, Assistant Engineer, under the direction of William E. Merrill, Major of Engineers, United States Army.

TABLE A.—*Exhibiting all information thus far obtained relative to the locks and dams constructed and projected on the Kentucky River between its mouth and the mouth of Middle Fork, being a distance of 257½ miles.*

Number.	Locality.	Distance from Ohio River.	Height above Ohio River.	Height above sea-level.	Length of pool.	Dams.						Old dams, cost per linear foot.	New dams, estimated cost per linear foot.	Old dams, estimated cost of repairs.	Total estimated cost per dam.	Locks.						Total cost of work to be done, per lock and dam.	
						Foundations.	Height.	Length.	Old, base width.	New, base width.	Slopes, base width.					Lift.	Length of chamber.	Width of chamber.	Height of guard.	Old, cost.	New, estimated cost.		
0	Ohio River	0.0	0.0	410.0	4.0																		
1	Horse-Shoe Bend	4.0			27.0	Gravel	20	500	80		4 to 1	$56 50			$19,820	$19,820	15	170	38	10	$187,971		$19,820	Repairs.
2	Six-Mile Ripple	31.0			11.0	Rock and gravel	21	429	80		4 to 1	59 60			18,324	18,324	12	170	38	10	121,104		18,324	
3	Cedar Ripple	42.0			23.0	Rock	21	464	66		4 to 1	59 60			11,432	11,432	14	170	38	10	99,769		11,432	
4	Lee's Ripple (Frankfort)	65.0	42.0	452.0	17.2	do	20	530	66		4 to 1	54 00			9,456	9,456	14½	170	38	10	98,863		9,456	
5	Steel's Ripple	82.2			13.0	Rock and gravel	25	450	66		4 to 1	66 67			25,770	25,770	14½	170	38	10	98,891		25,770	
6	Clear Creek	95.2			22.4	Rock	28	350		56	4 to 1		$50 00		17,500	17,500	13	170	38	10		$65,000	83,500	
7	Shaker's Ferry, High Bridge	117.6			15.0	do	27	400		54	4 to 1		48 00		19,200	19,200	13	170	38	10		64,000	82,200	
8	Fugale's Ripple	132.6			16.0	Rock and gravel	25	400		58	3 to 1		58 00		23,200	23,200	14	170	38	10		67,000	90,200	
9	Goggins Ripple	148.6			16.0	Rock	21	350		42	4 to 1		38 00		14,000	14,000	13	170	38	10		50,000	64,000	
10	Hind's Creek Ripple	164.6			19.0	do	28	350		56	4 to 1		50 00		15,750	15,750	14	170	38	10		63,000	78,750	
11	Muddy Creek Ripple	183.6			11.5	Rock and gravel	27	350		56	4 to 1		63 00		22,050	22,050	10	170	38	10		69,000	91,050	
12	Cow Run Ripple	195.1			15.2	Rock	22	350		44	4 to 1		40 00		14,000	14,000	11	170	38	10		59,000	73,000	
13	King's Mill Ripple	210.3			9.2	Rock and gravel	24	350		64	4 to 1		56 00		19,000	19,000	12	170	38	10		66,000	85,600	
14	Doe Run Ripple	219.5			15.6	Rock	23	350		46	4 to 1		42 00		14,700	14,700	12	170	38	10		60,000	74,700	
15	Ross Creek Ripple	235.1			8.3	Rock and gravel	24	350		58	3 to 1		56 00		19,600	19,600	14	170	38	10		66,000	85,600	
16	Salt Rock Ripple	243.4			5.3	do	33	350		71	5 to 1		70 00		24,500	24,500	11	170	38	10		75,000	99,500	
17	Crooked Shoals	248.7			8.8	do	22	350		52	4 to 1		50 00		17,500	17,500	9	170	38	10		64,000	81,500	
	Beattyville	253.9	225.6	635.6		Rock																		
	Middle Fork	257.5	228.0	638.0		Rock and gravel																		
	Grand Total																						$1,074,402	

Should the five existing dams be rebuilt instead of being repaired, the above estimate will be increased $75,000. The excessive cost of the old works is principally due to the employment of an ornamental class of masonry, and to the fact that these works were nearly ten years under construction, in which time they suffered repeatedly from high water, and from suspensions due to sickness among workmen, and other causes.

TABLE B.—*Exhibiting all information thus far obtained relative to the establishment of slack-water on the North Fork of the Kentucky River, from the mouth of Middle Fork to the mouth of Leatherwood Creek, in Perry County, being a distance of 121.3 miles.*

Division.	Length.	Distance from—		Rise.	Average rise per mile.	Height above—		Average width of channel.	Height of bottom.	Character of foundation. *	Number of locks.	Lockage.	Average cost—			Total cost.	Contingent expense.	Grand total.
		Beattyville.	Ohio River.			Ohio River.	Sea-level.						Per lock and dam.	Per foot lift.	Per mile.			
Middle Fork	0.0	3.6	257.5	0.0	.....	228.0	638.0	225	40	.....	.....	.....	.....	.....	.....	.....	.....	.....
War Creek	24.3	27.9	281.8	43.0	1.8	271.0	681.0	200	40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jackson	19.6	47.5	301.4	.....	.....	.....	.....	175	40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Troublesome Creek	11.0	58.5	312.4	49.9	1.6	329.9	730.9	150	40	.....	7	99.0	$68,000	$4,800	$8,654	$476,000	.....	.....
Hazard	49.4	107.9	361.8	.....	.....	.....	.....	125	30	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carr's Fork	6.0	113.9	367.8	.....	.....	.....	.....	100	30	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leatherwood Creek and Brashear's Salt Works	11.0	124.9	378.8	203.9	3.1	524.8	934.8	100	30	.....	14	204.0	56,000	3,840	11,878	784,000	$126,000	$1,386,000

*Rock may generally be found at or near he surface; otherwise gravel.

This table is based solely upon information derived from the reports of State Engineer Sylvester Welch, esq., made in the year 1837, such use having been made of this information as the altered circumstances demanded.

TABLE C.—*Exhibiting all information thus far obtained relative to the improvement of the North Fork of the Kentucky River from the mouth of Leatherwood Creek to the source of the river in Payne's Gap of the Pine Mountain, being a distance of 43.8 miles.*

Division.	Length.	Distance from—		Rise.	Height above—			Average rise per mile.	Width of channel.	Height of bottoms.	Character of foundation.	Obstructions.		Grand total.
		Leatherwood.	Ohio River.		Leatherwood.	Ohio River.	Sea-level.					Kind.	Cost of removal.	
Leatherwood Creek	0.0	0.0	378.8	0.0	0.0	524.8	934.8	0.0	100	25	Rock may generally be found at or near the surface; otherwise gravel.	Island	------	------
Line Fork	2.9	2.9	381.7	15.6	15.6	540.4	950.4	5.2	100	25		Sharp bend on ripple and rocks in channel	$1,600	------
Rockery Creek	3.3	6.1	384.9	23.9	39.5	564.3	974.3	7.5	80	25		Mill-dam and large bowlders	700	------
Rockhouse Creek	3.3	9.4	388.2	20.2	59.7	584.5	994.5	6.1	80	25		Mill-dam and island	800	------
King's Creek	4.9	14.3	393.1	38.3	98.0	622.8	1,032.8	8.0	80	20		Rocks in channel	1,000	------
Smoot's Creek	2.4	16.7	395.5	21.9	119.9	644.7	1,054.7	9.1	80	20		Island and rocks	750	------
Dry Fork, Gum Spring	4.0	20.7	399.5	33.1	153.1	677.9	1,087.9	8.3	80	20		Mill-dam and rocks	900	------
Sandy Lick	4.8	25.5	404.3	41.2	194.2	719.1	1,129.1	8.6	80	20				------
Whitesburg	1.2	26.7	405.5	12.0	206.2	731.0	1,141.0	10.0	80	20		Mill-dams and rocks	900	------
Bottom Fork	6.9	33.6	412.4	60.3	266.5	791.3	1,201.3	8.7	60	15		Wooded islands and drift	2,360	$9,010
Boone's Fork	4.6	38.2	417.0	50.8	317.3	842.1	1,252.1	11.0	30	10				------
James Craft's	2.4	40.6	419.4	78.3	395.6	920.4	1,330.4	32.6	15	5		Wooded Islands and drift	------	------
Bentley's Mill	2.0	42.6	421.4	188.9	584.5	1,109.3	1,519.3	94.4	8	5		do	------	------
Payne's Gap	1.2	43.8	422.6	369.7	954.2	1,479.0	1,889.0	308.1	0	0			------	------
Elkhorn Fork of Big Sandy	0.3	44.1	422.9	------	902.4	1,427.3	1,837.3	------	------	------			------	------
Pound Gap	1.0	45.1	423.9	------	1,491.7	2,016.5	2,426.5	------	------	------			------	------

TABLE D.—*Exhibiting all information thus far obtained relative to the establishment of slack-water on the South Fork of the Kentucky River, from its mouth at Beattyville to the Goose Creek saltworks, at the confluence of Collins Fork and Goose Creek, being a distance of 68.5 miles.*

Division.	Length.	Distance from—		Rise.	Height above—			Average height of bottoms.	Average width of channel.	Average length of dams.	Total lockage.	No. of locks.	Lock-chambers (size of).		Lockage (estimated cost per foot).		Cost.		Contingent expenses.	Lockage (estimated cost per foot lift).	Grand total.
		Beattyville.	Ohio River.		Mouth.	Ohio River.	Sea-level.						Report of 1837.	Present.	Report of 1837.	Present.	Per lock and dam.	Total.			
Beattyville	0.0	0.0	253.9	0.0	0.0	225.6	635.6	.....	.....		212.7									$4,550	
Booneville	12.2	12.2	266.1	25.0	25.0	250.6	660.6	30	180	200	.....	1	120×19	170×38	$4,800	.....	$65,000	$65,000	.....	.....	.....
Red Bird	29.8	42.0	295.9	106.7	131.7	357.3	767.3	30	150	200	.....	7	120×19	170×38	4,800	.....	65,000	455,000	.....	.....	.....
Collins Fork	26.5	68.5	322.4	75.0	206.7	432.3	842.3	20	85	150	.....	6	120×19	170×38	4,800	.....	60,000	360,000	$88,000	.....	$968,000

NOTE.—The data from which this estimate is made above the town of Booneville is derived entirely from reports of State Engineer Sylvester Welch, esq., and his assistants, made in the year 1837, and partially confirmed by reconnaissances made by the writer in 1872.

TABLE E.—*Exhibiting all information thus far obtained relative to the project of connecting the headwaters of the South Fork with the waters of the Cumberland River, at the Cumberland Ford, in Josh Bell County, by means of a canal.*

Division.	Length.	Ascent.	Descent.	Height above—				Canal.					Cumberland dam, height.	Lockage, estimated cost per foot.	Summit cut, estimated cost.	Cost.	
				Mouth of Collins Ford.	Beattyville.	Ohio River.	Sea-level.	Total length.	Lockage.	Summit Cut.						Total cost.	Grand total.
										Depth.	Assumed average cut.	Length.					
Mouth of Collins Fork	0.0	.....	.....	0.0	206.7	432.3	842.3	36.33	160	40	30	5,600	25	4,100	.....	$656,000	
Junction of Collins Fork and Barboursville road	13.5	97.4	.....	97.4	304.1	529.7	939.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Summit	0.85	105.3	.....	202.7	409.4	635.0	1,045.0	.....	.....	.....	.....	.....	.....	.....	$162,000	162,000	
Branch of Richland Creek	1.0	.....	36.5	166.2	372.9	598.5	1,005.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Cumberland River, Barboursville	6.0	.....	41.7	124.5	331.2	556.8	966.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Cumberland Ford	15.0	20.0	.....	144.5	351.2	576.8	986.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	
																	$818,000

The above table is prepared entirely from the report made in 1837 by Sylvester Welch, esq., engineer of the State of Kentucky, except in respect of estimates of cost, which are based upon that data and the results of reconnaissances made by the writer in 1872.

TABLE F.—*Exhibiting all information thus far obtained relative to the establishment of slack-water on the Middle Fork of Kentucky River, from its mouth, in Lee County, to the crossing of the old Hazard and Manchester road, in Leslie County, being a distance of 68 miles.*

Locality.	Ripples.			Distance from—		Rise.	Height above—			Average—			Foundation.	Locks and dams.				Grand total.
	Number.		Length.	Mouth.	Ohio River.		Mouth.	Ohio River.	Sea-level.	Rise per mile.	Width of channel.	Height of bottom.		Number of.	Average cost per.	Total cost.	Cont'g't expenses.	
Mouth of Middle Fork	----	----	0	0.0	257.5	0.0	----	228.0	638.0	----	110	40	Rock foundation may generally be found at or near the surface.	----	----	----	----	----
	1	Head of shoal	2.0			3.84												
		Head of ripple	0.5			6.35												
	2	Foot	3.7			3.13												
		Head	0.2			2.28												
Mill Branch	3	Foot	3.7			4.44												
		Head	1.0	11.1	268.6	6.65	26.69	254.69	664.69	2.4	130	40						
Twin Creeks	4	Foot	1.6	12.7	270.2	0.00	26.69	254.69	664.69	0.0	----	----						
		Head	0.1			2.21												
	5	Foot	1.1			0.00												
		Head	0.2			0.82												
Pape's Branch	6	Foot	1.6			0.64												
		Head	0.7	16.4	273.9	3.00	33.36	261.36	671.36	2.1	130	----						
Jett's Creek	7	Foot	1.0			2.63												
		Head	0.5	17.9	275.4	3.11	39.10	267.10	677.10	3.2	130	----						
1½ miles below Puncheon Camp Creek	8	Foot	1.5			0.00												
		Head	0.2	19.6	277.1	1.86	40.96	268.96	678.96	1.1	130	40						
	9	Foot	3.4			2.54												
		Head	0.1			0.94												
Shoulder Blade	10	Foot	0.8			0.44												
		Head	0.3	24.2	281.7	3.97	48.85	276.85	686.85	1.7	130	----						
	11	Foot	1.7			1.08												
		Head	0.3			3.61												
Mill Creek	12	Foot	0.5			0.23												
		Head	0.1	26.8	284.3	1.69	55.46	283.46	693.46	2.5	130	----						
	13	Foot	1.6			1.64												
		Head	0.2			2.02												
Canve Fork	14	Foot	0.5			1.04												
		Head	0.2	29.3	286.8	2.06	62.22	290.22	700.22	2.7	130	30						
	15	Foot	1.1			0.54												
		Head	0.3			2.65												
	16	Foot	0.4			0.66												
		Head	0.3	31.4	288.9	2.78	68.85	296.85	706.85	3.2	130	----						
Heavald's Creek	17	Foot	1.4			1.09												
		Head	0.3			3.73												
Long's Creek, Crockettsville	18	Foot	2.6			3.18												
		Head	0.5	36.2	293.7	4.66	81.51	309.51	719.51	2.6	130	----		6	$55,000	$330,000	----	----
Hazard and Manchester road	----	Foot	31.8	68.0	325.5	87.49	169.00	397.00	807.00	2.7	130	30		7	55,000	385,000	$71,000	$786,00

All of the information contained in the above table, between the mouth of Middle Fork and Long's Branch (Crockettsville), was obtained from the survey made under the direction of Col. Wm. E. Merrill. That above Long's Branch, up to the Hazard and Manchester road, was derived from the report of State Engineer Sylvester Welch, made in 1837.

The Kentucky River Navigation

A report of a survey of the Kentucky River from its mouth to Frankfort, made by Martin Hawkins of Frankfort, and presented to the Kentucky Convention of 1799. Published in the Palladium, a Literary and Political Repository, by Hunter and Beaumont, Frankfort, November 28, 1799:

REMARKS ON THE IMPROVEMENT OF THE KENTUCKY RIVER

Dollars

1. When the river is 14 inches deep at the island opposite to Frankfort; the fall to the lower end of the fish trap is 900 yards long, and the whole descent 60 inches.

There appears to be a small bar entirely across the river here, which to make the channel complete, would require some blowing of the rock: but the river might be made tolerably passable by an expence of 50 dollars, in straightening the sluice and deepening it, so as that boats drawing 15 inches water will pass when the river is lowest 50

2. Greenup's island 100 yards long, 4 inches fall. Essex Island, 160 yards long, 48 inches fall. The fall is gradual and needs but little improvement. The expence might be about 50

3. To the narrows 120 yards, 16 inches fall 30

4. Steel's Island 200 yards, 36 inches fall 50

5. Elkhorn 1,000 yards, 70 inches fall. The bottom is good and the descent very gradual 100

6. Flat creek 50 yards: 4 inches fall .....

7. Rack punch spring 100 yards: 24 inches fall 30

8. A small creek, 200 yards: 20 inches fall 30

9. Cedar 1,000 yards: 100 inches fall.

This fall is occasioned by the stone thrown into the river from the creek; as are almost all the falls in the river. The stones are small and might be easily moved.

To straighten this fall, which is the worst in the river, will take about 300 dollars: but it might be made tolerably passable, at an expence of about 150 dollars: and that sum at least, must be laid out here 150

10. Severn, 240 yards: 61 inches fall. To straighten this channel, will take 100

11. Long reach, 6 inches fall.

12. Six mile Creek, 50 yards: 20 inches fall 30

Here commence the sand beds, which are left in about 10 inches water: which occasion a difficulty to the first boat that passes after a fresh:- but a single boat's going down causes a small channel thro' the sand, which is increased, both by the current and the passing of every boat that follows.

13. Clay Lick 70 yards: 6 inches fall 30

Here is a Sycamore tree that reaches entirely across the river, on which you may cross without wetting your feet. In low water every boat that passes is obliged to unload, and be dragged on dry land round it. The losses sustained by adventurers, with the labour, that this tree has cost within five years has been estimated by men of the best information at 3,000 dollars.

14. Stoney crossing, 48 yards: 9 inches fall 30

15. Drinnon's lick creek, 100 yards: 48 inches fall, 150 dollars will render this sluice more straight and gradual 150

16. Upper Twin to lower Twin—24 inches fall 50

17. White's run 120 yards: 26 inches fall 40

Total Expence 920

Appendix

The whole amount of the descent at the several falls 530 inches, or 49 feet 4 inches.

On the most moderate calculation it will take 1,000 dollars to make the falls in the river from Frankfort to Ohio straight and gradual, and about 500 dollars to cut down the trees on one side of the river or the other to common high water mark. This improvement will reduce the carriage of goods from 4s. a hundred to 1s. 6d. up the river, and from 3s. to 1s. a hundred down the river, and render the the passage of flat boats perfectly safe and easy:—so that no person navigating the river will object to pay one penny a hundred as a toll in going down, and two pence on the hundred in coming up.

I have thought of several modes, by which this business may be carried into execution:

1. The Virginia plan of improving the James and Potomac rivers is one. This is by forming a company to undertake and compleat the work at their own expence, and to be reimbursed by a perpetual toll. But to this it may be objected that it is saddling an everlasting tax on our posterity,—and that too for the sake of raising a very inconsiderable sum of money.

2. The Pennsylvania plan is somewhat similar, to that of Virginia, except that the State reserves to itself the power, of purchasing the company's right in the navigation and tolls after a limited period, on such terms as may be fixed upon by disinterested commissioners.

But my doubts are whether it would be possible to find persons who would be willing to undertake the work on this plan.

3. A more practicable plan, in my opinion, would be that of appropriating about 20,000 acres of land, to the fold at 10 annual instalments,—the first to be paid in advance, which would commence the work the next year. There is a company already formed, who will advance 1,000 dollars a year for 10 years for State land at half a dollar an acre, provided the money is appropriated to this business. This will amount to ten thousand dollars,—a sum fully sufficient to compleat the improvement of the Kentucky river from its source,—including every necessary lock on the river and every other improvement that could be wished for. When we take into consideration the value of the immense water works, which might be erected at the different falls, where locks may be necessary it is my opinion that the moderate tolls before mentioned, would reimburse the public by repaying the principal with interest in one century.

Martin Hawkins.

Lengthy remarks on the advantages that will arise on the improvement of the rivers in this State, are useless. Those which Virginia has experienced are well known in this country. But as those in this country would far exceed them I will state a few of them. The merchant may lay in flour for exportation in the month of November; and by keel boats or batteaux, get his cargo to the Ohio river in the month of December; where he may probably ship it immediately, and arrive on the sea-board in January; where if he sells his cargo, his returns will be made in February; and if not, his cargo being stored in winter, will keep all summer without damage. But on the present plan of shipping, it is almost impossible to get a boat out of any small river till the winter and ice commences—spring follows—and then the necessary delays which take place bring mid-summer before the boat reaches the sea-board, and as the extreme heat of the climate and dampness of the river causes a constant hot moisture to settle on the cargo, a sweat commences, which rots the whole cargo. The last years experience have so fully proved this, it needs no further remarks. Had the flour shipped from Kentucky during last spring, all reached New Orleans by the month of April, I can venture to say the merchants would have sold their cargoes, and have received their money in return six months sooner than they generally have; and the flour, if not used, would have continued to this day sound and in good order; and the planter would now have been able to get 6s. per bushel for his wheat, instead of 3s. and for every other kind of produce in the same proportion.

M. Hawkins.

The Kentucky River Navigation

EXTRACTS FROM THE PAPERS OF JUDGE HARRY INNES, PRESENTED TO THE LIBRARY OF CONGRESS BY GEORGE D. TODD

Extracts from a letter written by Charles Wilkins to Judge Harry Innes describing trips from Pittsburg to New Orleans, in 1789 and 1790:

"I descended the Ohio & Mississippi from Pittsburg to New Orleans in the Spring of 1789, with a cargoe of flour, by permission of Governor Mero, granted to Col. Daniel Clark. The following spring (1790) I again descended with a cargoe of flour & merchandise.

"The duties demanded by the Spanish Government on cargoes belonging to citizens of the United States were twenty per cent. ad valorum on American produce.

"I cannot with precision declare whether or not they were permitted to export their cargoes. I believe that vessels were not suffered to sail to the United States but by permission of the Governor of the Colony; and that there were but a few vessels sailing under this privilege, & these vessels were generally loaded by their owners. American vessels were not suffered to enter the port of New Orleans, only under certain restrictions, which were at the option of the officers of the government. I understood that six per cent. was the duty charged upon every article exported from New Orleans to the United States. This sum was paid by myself upon a quantity of Peltry, which I purchased and exported in the year 1790.

"It was the usual practice upon their arrival at Natchez for owners and Boat crews, to take the Oath of Allegiance to the King of Spain; It was practiced by those who went to that Country at the time alluded to above to induce the Spanish officers to believe, that it was their intention to become subjects & as preparatory to this step & previous to obtaining a passport to proceed, the Oath of Allegiance as administered, upon which a passport was granted, or permission to sell at Natchez was procured. Americans who migrated to that Colony were permitted to sell their property free of duty.

"Various modes were adopted to evade the payment of the duties by adventurers to New Orleans, and it was practiced by others as well as myself, to petition the Governor for a grant of land under the pretense of becoming an inhabitant & I was induced to believe that the mildness of his Catholic Majesty's

Colonial government was always spoken of with praise. In the year 1789 a memorial was presented by myself in Spanish language, the substance of which having been translated to me was to that effect; It was recommended to me upon my arrival at Natchez (in order to evade the payment of duties on my second cargoe), to obtain permission to unload. I did so and afterwards consigned the cargoe to Mess. Clark & Reese at New Orleans, as being the property of their concern at Natchez. As I descended the river under the permission of the governor in 1789 it was not necessary that I should resort to that way to avoid the duties for that year, altho' the government had a claim on me, I did not expect that it would be exacted.

"I am induced to believe that making consignments in this way was practiced by others.

"The exportation of Specie was not permitted, but for the ex-press purpose of purchasing slaves for the use of the Colony. The indulgence was sometimes granted to influential individuals, and I understood that others were suffered to carry away specie upon the same terms that other property was permitted—at the rate of six pr. cent. The regulations of the government upon this subject were that each Captain of a vessel was entitled to take with him $200.—Mate $150.—& each seaman & passenger a sum not exceeding $100. The usual mode of getting specie out of the Colony was by smugling or Corruption of the officers of the Government.

"In the Spring of the year 1790 previous to my arrival at New Orleans, by regulation of the Spanish Government, Tobacco was not purchased by the King of Spain, or rec'd in his warehouse, as had hitherto been practiced, by which means an immense quantity of that article was on hand, the growth of the United States, as well as the Spanish Colonies on the Mississippi. Tobacco from Kentucky would not command the price of freight. Several hundred hogsheads could have been purchased at five dollars per hogshead—vessels could not be had to remove it to the United States.—The Brig in which I sailed to Philadelphia was loaded with tobacco purchased at $5 to $10 per hogshead which I afterwards saw selling for four or five dollars per Cwt. in Philadelphia.

"I was prevented from making the oath of Allegiance by an officer observing me; that 'It is not necessary for you to take the oath.'

"In the year of 1790 when I made application for my passport it was communicated to me that our vessel would be

searched at the Belize for specie. I made this known to the other passengers, some of whom distributed their money among the ship crews and passengers who had none, and others concealed it on board. A strict search was made but no money found, other than was allowed by the usage of the country."

A copy of a letter written by James Wilkinson to Hugh M'Ilvain, a Lexington merchant, dated March 17, 1791, containing instructions for evading the Spanish Navigation laws:

Frankfort on Kentucky,
March 17th, 1791.

Mr. Hugh M'Ilvain,
Sir:

You are about to embark on an Expedition of the highest importance to me and deeply interesting to yourself; It is therefore that I take up my Pen, to give you such advice and instructions, for your Government, as my experience induces me to believe, may be profitable to us both.—

You will proceed with the five boats for New Orleans with all expedition consistent with safety, always bearing in mind that it is a matter deeply interesting to you to get there at least a week or ten days before Mr. Winter—You will sail day and night in the Ohio, unless in Blustering weather, keeping two hands in each boat constantly on the watch. You must take arrangements to enter the Mississippi in the morning if possible, as the hands in the course of a day's run, acquire some knowledge of the caution necessary in the impetious Current.—In that river you must always come too before dark, and as I expect the river will be high, you must make it a rule to moor your boats to some point of Willows or Cotton Wood. You must never come to in the bends of the River or indeed suffer your boats to float near shore, as there is danger if the water is over the banks of being swept into the woods or of trees falling on you. R. Taylor is a careful hand and a pretty good judge of this navigation, as he has been down the river several times.—Moore your boats as near together as possible that in case of accidents they may assist each other and be regular in keeping watch in each boat, for fear of leaks or other accidents. When you come within six leagues of Lance a la Grace get with a canoe and two hands, push down to the command and order the boats to go on without

waiting,—you will show the invoice of your Cargoe and the list of your hands to the Commandant, make him a small present, beg him to pardon your hurry and push the boats—never halt anywhere after this before you reach Natchez, unless at night. When you get to that place put on your best Bib & Tucker and wait upon the Governor or Commandant, with your invoice, manifest and the list of your Crew with their several occupations deliver your letters and inform him that you have come down with as many of the hands as you can persuade into the humour to make Establishments in the Province, and request of him to administer the Oath of Allegiance, of which when done take a certificate to show that you are a subject, make him a present, beg his passport for New Orleans and proceed as speedily as possible—at the little ports along the river, between that and New Orleans you must go or send ashore in a canoe and exhibit your passport to several Commandants—when you arrive in New Orleans be ready dres'd and wait immediately upon the Governor, with your letters, certificate of Allegiance, invoices, manifest & list of your crew—any body will show you the way to the Governor, or perhaps a Sergeant may carry you to him as this is customary. Say to the Governor, that having formed a determination to make a settlement in Louisiana, you had invested some of your property in tobacco, which should be happy to furnish to the Royal Magazine, *if it should be wanted*, and that in the meantime you should thank his Excellency for permission to *store* in the Kings Magazine—to his Enquiries respecting Kentucky, say nothing that is not flattering & favorable to Louisiana. Say that the ignorant and low class of people with a very few reputable characters, such as Marshall Scott & Muter, are hostile to Spain, but that the judicious, Intelligent men of the Country, know the importance of supporting an amicable intercourse;—consider me the head of those Characters, and pay me any other compliments you may think I deserve. Say that the rumor of the British War and O'Fallons & other projects had distracted the minds of our people for some time past, but that many persons had again begun to talk of moving to Lance a la Grace & Natchez. Inform him that you are bred to commerce but that your principle view is settling in Louisiana, was to establish several useful and valuable manufactories in Comp'y with Gent'm whom you expect after you in two or three weeks. Mention Mr. Walsh, and inform the Governor who and what he is. When you have done with the Governor, find out Nolan privately & as

privately deliver him your letters—He will tell you what to do afterwards, & you may rely as implicitly on his honor & sincerity as any man in existance. If Nolan should not be in New Orleans, wait on Mr. Jones with the letter and persue his council and advice—The day after your arrival—you will wait on Mr. Gilbert Leonard, Secretary of the Intendency & commonly called Gilberto—at his house early in the morning deliver his letter in private, telling him it was my direction you should do so. Then ask his advice with respect to your Toba, tell him that you rely entirely on his friendship and that you will be willing to give 4M Doll. to get it admitted into the Royal Magazine, but you will first consult F. Nolan on that point, you must act with decision, as Winter will be close on your heels, you must not fail to inform Nolan of everything about Winter that the Toba is Jany &c. You will talk to the Governor of Walsh's merits & his plans; that he has intended to write and solicit a loan to enable him to set up his works, but that I advised him to purchase a quanty of Toba, as I was satisfied the Governor would to forward so important an end admit into the Royal Magazine if possible. Present Don Andres the Globe, which I send down, be very attentive to him, he is a man of great worth. Present my letters to Mr. Conway with the round beef, and make all the use of him in your power, as he has influence with Mr. Miro, but you must not trust him, as he is hollow hearted. If Holmes should be at N. O. do not trust him as his views will clash with our own, in short trust no person but Nolan or in his absence Mr. Jones.

If after satisfying the several debts stipulated in our agreement a balance or three thousand dollars or more should remain in your hands it is agreeable to you to enter into a Copartnary with me on principles of perfect equality, you will add an equal sum in cash, and lay a suitable and proportionable Cargo for our Joint acct. Calculating to extend our credit as least 50 pr. ct. beyond the Capitol Stock, under the firm of M'Ilvain & Co., keeping the connexion a secret from all persons. If the balance should be less than 3 m. D. and such a sum as will not justify your forming a connexion on equal terms then you will be pleased to invest it agreeable to the inclos'd memo. for your separate acc. on the most reasonable terms possible, and at any rate I must pray of you to execute the order for Copper, &c, and bring out with you. At Bottom you will find a copy of the Kind of Acct. you must take from Vaughan. You will not fail to have insurance made if possible on the tobacco or the money

which you may ship for our Januarys Acct. Relying on your friendship & attention to my interests, I wish you a happy voyage, and am your friend,

truly & sincerely,

James Wilkinson.

The foregoing is a copy of the instructions which I have this day received from James Wilkinson, agreeable to an article of agreement.[A]

Hugh McIlvain.

Extract from a letter written by Andrew Baynard of Philadelphia to Judge Harry Innes of Kentucky, describing a trip by water from Louisville to Philadelphia, dated November 14, 1790:

"Philadelphia, 14th Nov. 1790.

"Dear Sir:

The hurry with which I quitted the falls after getting my boats a-float prevented my giving you any further account of what happened than what was contained in the letter I wrote you immediately after my misfortune—the boats continued on the rocks for two weeks & were at last (after unloading them) taken off by some men to whom I had to pay L 20 for their services, & was extremely happy in getting away at that rate—we met with few or no difficulties in the remainder of our way down the river, tho' it was extremely tedious owing to the slackness of the current, & did not reach New Orleans till the 30th of June—unluckily about 2 weeks too late for a vessel which sailed for Philadelphia—Mr. Pollock to whom I delivered the tobacco which I took down, had charter'd a vessel from Philadelphia, & expected to have sailed by the middle of July, but unexpected business perpetually presenting itself, he could not get away till some time in August, the vessel dropped down

[A]Original in possession of George D. Todd, Louisville, Ky. In a contract between Wilkinson and M'Ilvain it was agreed that all the business on this trip should be transacted in the name of Hugh M'Ilvain but at the sole risk of Wilkinson. (George D. Todd, How the Pioneers of the West Marketed their Products and the Difficulties they had to contend with; unpublished manuscript, Filson Club Papers, May 4, 1903.)

from the town on the 9th of that month, but owing to his business & head winds even after he came on board we did not get to sea till the 13th of September, which brought us into the hurrican months & we had been but two days at sea before we experienced the consequence of it. The wind was ahead from our first putting out & blew a severe gale for two days which had almost drove us ashore into the Bay of St. Benard's where it is said there is a race of cannibals who devour every one they can lay their hands on, luckily the wind came about to an opposite point & blew with as great violence as ever, which carried us off the coast tho' it endangered the loss of the vessel, it did not long continue so but came round to its old quarter & kept us beating about Cuba for several days & finally obliged us to put into the Matanzas a port about twenty leagues above the Havanna, where we continued a week, & again ventured out, but without experiencing any better fortune & were till the 5th of November before the vessel reached Philadelphia."

An Editorial from the Kentucky Gazette, Lexington, April 22, 1816, referring to a steamboat which on April 21, 1816, left the mouth of Hickman Creek for New Orleans:

"A Steam Boat owned by a Company of gentlemen of this town was to sail for New Orleans yesterday from near the mouth of Hickman Creek. We are informed that she is to be worked on a plan invented by Mr. West of this place near twenty years ago and in a manner distinct from any other steamboat now in use. On trial against the current of the Kentucky when the river was very high she more than answered the sanguine expectations of her owners and left no doubt on their minds that she could stem the current of the Mississippi with rapidity and ease. Should they not be disappointed in their expectations and should they be able to put down Livingston's Monoply they may anticipate much profit from their enterprise. But to put down this monoply we advise them to provide enormous bail at New Orleans and give high fees to lawyers for such we understand has been the fate of all owners of Steam Boats in that quarter who have not obtained Livingston's sovereign and generous permission to navigate within the State of Louisiana.

"How that State became possessed of power to grant this monoply we are at a loss to find out. The 8th section of the 1st article of the Federal Constitution gives to Congress we

had always thought the sole right 'to regulate commerce among the several states,' and from the 10th section of the same article the states are forbidden even 'to lay imports or duties on imports or exports except what may be absolutely necessary for executing the inspection laws.' And the clause respecting patent rights authorizes Congress to secure to inventors the benefit of their own discoveries."

A list of the warehouses on the Kentucky River, established by special acts of the Kentucky Legislature between 1792 and 1810, for the storage and inspection of Tobacco.

1. Cleveland's, Fayette County, December 20, 1792—Cleveland's Landing. (Littell, Vol. I, pp. 135-150; Vol. II, p. 139.)
2. Stafford's, Fayette County, December 20, 1792—Stafford's Landing. (*Ibid.*)
3. Holder's, Clark County, December 2, 1792—mouth of Howard's Creek. (*Ibid.*)
4. Bush's, Clark County, December 20, 1792—opposite Boonesborough. (*Ibid.*)
5. Hogan's, Fayette County, February 10, 1798—mouth of Hickman Creek, Jessamine County. (*Ibid*, Vol. II, p. 139.)
6. Hickman's, Garrard County, February 10, 1798—land of James Hogan, opposite mouth of Hickman Creek. (*Ibid.*)
7. Curd's, Mercer County, February 10, 1798—Mouth of Dix River. (*Ibid.*)
8. Harrod's Landing, Mercer County, February 10, 1798—land of Walter Beall, town of Warwick. (*Ibid.*)
9. Boone's, Madison County, February 10, 1798—Boonesborough. (*Ibid.*)
10. Biggerstaff's, February 10, 1798—land of Samuel Biggerstaff. (*Ibid.*)
11. Scott's, Woodford County, February 10, 1798—land of Charles Scott, mouth of Craig's Creek. (*Ibid.*)
12. Frankfort, Franklin County, February 10, December 13, 1798—Daniel Weisiger's warehouse built on "warehouse lot." (*Ibid*, pp. 140-196.)
13. Samuel Jonhston's, Fayette County, February 10, 1798—at ferry below mouth of Hickman Creek. (*Ibid*, Vol. II, p. 173.)
14. Port William, Gallatin County, December 13, 1798—mouth of river. (*Ibid*, Vol. II, p. 196.)
15. Silver Creek, Madison County, December 13, 1798—land of Green Clay, mouth of creek. (*Ibid.*)
16. Quantico, Garrard County, December 13, 1798—land of William Davis, mouth of Sugar Creek. (*Ibid.*)
17. Hind's, Madison County, December 19, 1798—land of William Mayo, Jr. (*Ibid*, Vol. II, p. 213.)
18. Froman's, Woodford County, December 12, 1799—land of Jacob Froman, mouth of Brushy Run. (*Ibid*, Vol. II, p. 278.)
19. Hart's, Clark County, December 12, 179 —land of Nathaniel Hart, mouth of Four-mile Creek. (*Ibid*, Vol. II, p. 278.)
20. Stone's, Madison County, December 12, 1799—land of Green Clay, Stone's Ferry. (*Ibid*, Vol. II, p. 279.)
21. South Frankfort, Franklin County, December 12, 1799. (*Ibid.*)
22. Jack's Creek, Madison County, December 12, 1799, November 26, 1806 —land of Green Clay between Elk Branch and Jack's Creek. (*Ibid*, Vol. II, p. 279; Vol. III, p. 333.)

23. Warwick, Madison County, December 13, 1800—land of Robert Clarke, below mouth of Four-mile Creek at Clarke's Ferry. (*Ibid*, Vol. II, p. 383.)

24. Drennon's Creek, Henry County, December 13, 1800—land of Hite and Hogg, mouth of Creek. (*Ibid*, p. 384.)

25. Prestonville, Gallatin County, December 19, 1801—mouth of river, land of John Smith and Francis Preston. (*Ibid*, Vol. II, p. 456.)

26. Sullenger's, Henry County, December 19, 1801—land of Robert Sullenger, at crossing of the Newcastle-Big Bone Lick Road. (*Ibid*, p. 457.)

27. Gullion's, Gallatin County, December 16, 1802—land of Jeremiah Gullion, opposite the mouth of Eagle Creek. (*Ibid*, Vol. III, p. 23.)

28. Howard's, Clark County, December 26, 1805—land of John Howard, mouth of upper Howard's Creek. (*Ibid*, Vol. III, p. 322.)

29. Drowning Creek, Madison County, December 26, 1806—Mosby's land at mouth of Creek. (*Ibid.*)

30. Benson, Franklin County, November 26, 1806—land of Christopher Greenup, west side of river below Benson Creek. (*Ibid*, Vol. III, p. 332.)

31. M'Coun's, Mercer County, November 26, 1806—land of Samuel M'Coun, at ferry, near Clear Creek. (*Ibid.*)

32. Rough's Run, Woodford County, November 26, 1806—land of Jeremiah Buckley, mouth of Rough's Run Creek. (*Ibid.*)

33. Newton's, Jessamine County, December 2, 1806—land of Newton Curd, a half mile below the mouth of Dix River. (*Ibid*, Vol. III, p. 337.)

34. Wilkin's, Woodford County, January 1, 1808—land of Thomas Turpin, north side of river near Delaney's Ferry. (*Ibid*, Vol. III, p. 437.)

35. Tate's Creek, Madison County, February 3, 1808—land of William M'Bean, one fourth of a mile below the mouth of Tate's Creek. (*Ibid*, Vol. III, p. 451.)

36. Haydon's, Madison County, February 3, 1808—land of Richard Haydon, mouth of Muddy Creek. (*Ibid.*)

37. Hieronimous's, Clark County, February 23, 1808—land of Henry Hieronimous. (*Ibid*, Vol. III, p. 513.)

38. South Frankfort, Franklin County, Smart's, January 25, 1808—land of John Smart. (*Ibid*, Vol. III, p. 439.)

There were also a number of warehouses on the tributaries:

39. Swinney's, Montgomery County, December 12, 1799—land of Swinney and Collins, on Red River. (*Ibid*, Vol. II, p. 279.)

40. White's, Madison County, December 19, 1801—land of James White, mouth of Middle Fork of Station Camp Creek, Estill County. (*Ibid*, Vol. II, p.457)

41. Red River, Clark County, near Powell County, December 26, 1806—at Clarke's and Smith's Iron Works. (*Ibid*, Vol. III, p. 324.)

42. Saunder's, Gallatin County, February 23, 1808—land of Nathaniel Saunders, on Eagle Creek. (*Ibid*, Vol. III, p. 513.)

For the establishment of inspections of hemp and flour at the tobacco warehouses see Littell's Laws of Kentucky:

Acts of December 14, 1796 (*Ibid*, Vol. I, p. 370), February 22, 1797 (*Ibid*, Vol. I, p. 606), December 13, 1798 (*Ibid*, Vol. II, p. 196), December 12, 1799 (*Ibid*, Vol. II, p. 278), December 13, 1800 (*Ibid*, Vol. II, p. 383), December 19, 1801 (*Ibid*, Vol. II, p. 456), December 16, 1802 (*Ibid*, Vol. III, p. 23), December 26, 1805 (*Ibid*, Vol. III, p. 321), November 26, December 2, 1806 (*Ibid*, Vol. III, pp. 332-337), February 3, 28, 1808 (*Ibid*, Vol. III, pp. 451-513).

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LOGS AND BOOMS OBSTRUCTING NAVIGATION ON KENTUCKY RIVER
Push-boat Attempting Passage

SKIDS FOR LOADING LOGS ON TRUCKS—WITH TEAM AND LOADED TRUCKS TO RIGHT

TRESTLE WORK OVER CREEK

TRAMWAY

TANBARK WAGON, CAPACITY ONE CORD
Ready to Start for Railroad with the Exception of "Topping Off"

OX TEAM AND SLED
Used for Hauling Bark from Lower Slope to Wagon on Ridge

KENTUCKY RIVER AT BEATTYVILLE, LEE COUNTY—SAWMILL AND BOOMS

HAULING LOGS BY MEANS OF TRAILERS

STAVES STAVE SHOOT

After being "Trimmed" Down with Bucker

CREEK FULL OF STAVES DURING DRY SEASON